OWNER'S INSTRUCTION MANUAL

MANUEL D'ENTRETIEN MANUAL DO PROPRIETÁRIO

BETRIEBSANLEITUNG MANUAL DEL PROPIETARIO



86, 88, 107 AND 109

Commencing Vehicle Numbers:

Nos. de Véhicules de Début de Série:

Fahrzeuge Beginnend mit Nummern:

Desde Veiculos Nos.:

Desde Vehiculos Nos:

			86		88	
R.H.D. Home R.H.D. Export R.H.D. C.K.D. L.H.D. Export L.H.D. C.K.D.			57130001, 57140000, 17	76600001 77600001	111600001, 112600001, 113600001, 115600001,	112700001 113700001 114700001
		107 A S I C	STATION V	NAGON	10)9

	DASIC		SIMILOM AAWOOM	
R.H.D. Home	57200001, 572100000,	270600001	870600001, 131700001	121600001, 121700001
R.H.D. Export	57260001, 572700000,	276600001	876600001, 132700001	122600001, 122700001
R.H.D. C.K.D.	57760001.	277600001	877600001, 133700001	123600001, 123700001
L.H.D. Export	57230001, 57240000,	273600001	873600001, 134700001	124600001, 124700001
L.H.D. C.K.D.		274600001	874600001, 135700001	125600001, 125700001

he Rover C

SOLIHULL, WARWICKSHIRE,

Telephone:

Téléphone: Telephon: Telefone: Teléfono: Sheldon 2461 and 2613

Adr. Télégr.: Telegrams: Telegramme: Telegramas: Rovrepair, Solihull, England

London Service Station:

Service Station in London:

Station-Service à Londres: Estação de Serviço em Londres: Estación de Servicio en Londres:

SEAGRAVE ROAD, FULHAM, LONDON, S.W.6, ENGLAND

Telephone:

Telephon: Téléphone: Telefone: Teléfono: Fulham 1221

Adr. Télégr.: Telegrams: Telegramme: Telegramas: Rovrepair, Wesphone, London

By Appointment to Her Majesty Queen Elizabeth II



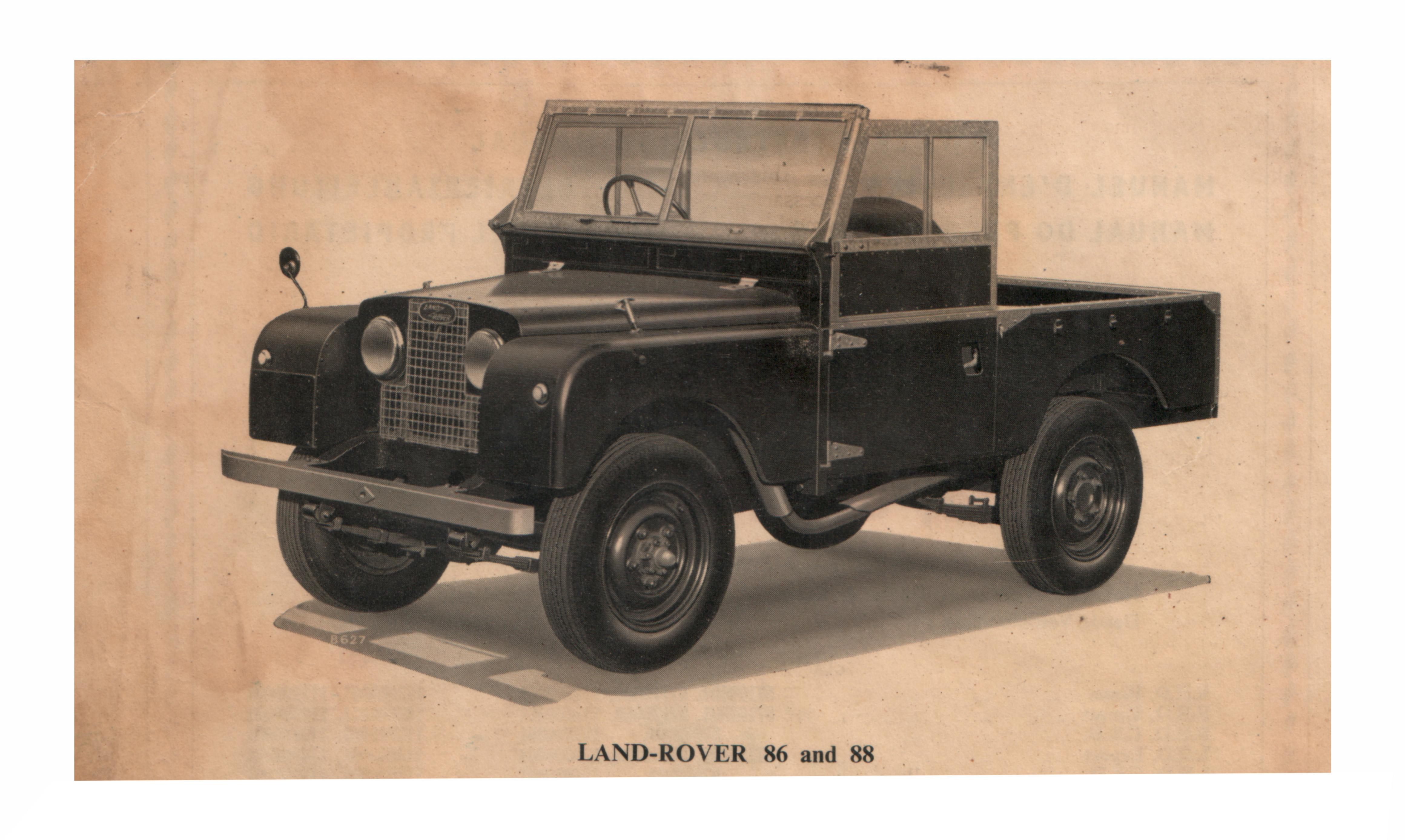
Manufacturers Land-Rovers

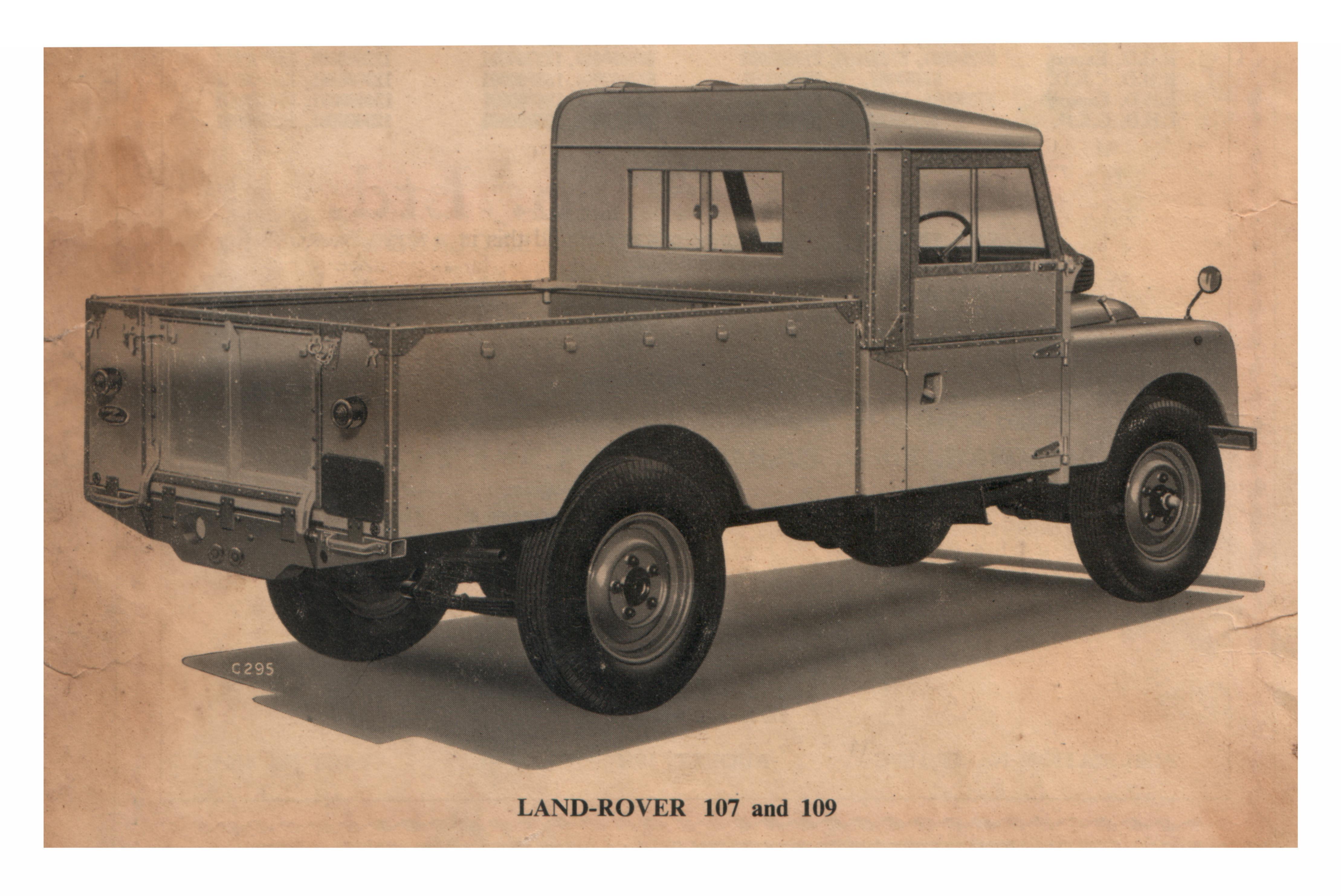
The Rover Company Ltd

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Introduction

Every effort has been made in the design of the Land-Rover to reduce the amount of attention which the owner must devote to upkeep; this manual provides all the information necessary for periodic maintenance attention. All models are very similar in design, differences being noted at appropriate points in the text.

For ease of reference, the manual is divided into four distinct sections:—

Section A describes the driving controls and includes general information to assist in operating the vehicle to the best advantage.

Section B deals with all the maintenance items.

Section C provides information on all items of extra equipment available.

Section D gives details of the facilities offered by our Service Department.

Although the instructions have been made as simple and clear as possible, there may be occasions when the owner finds himself in some difficulty, in which case reference should be made either to a Rover distributor or dealer or direct to our Service Department (see Section D).

It is well to read this book carefully on receipt of the vehicle, particular attention being paid to the running-in instructions on Page E-15.

GUARANTEE.

In order to obtain the Certificate of Guarantee for the vehicle, the guarantee form supplied should be filled in and returned by the owner or dealer; failure to return this form may seriously jeopardise any claim on the Company under the terms of the standard guarantee.

VEHICLE SERIAL NUMBERS.

The vehicle serial number, comprising eight or nine digits, will be found on the transfer box instruction plate on the dash panel over the gearbox cover. It is the same as the chassis number, which is stamped on the left-hand rear spring shackle bracket.

The full vehicle serial number must be quoted in all correspondence; the registration number of the vehicle is of no use whatever to us.

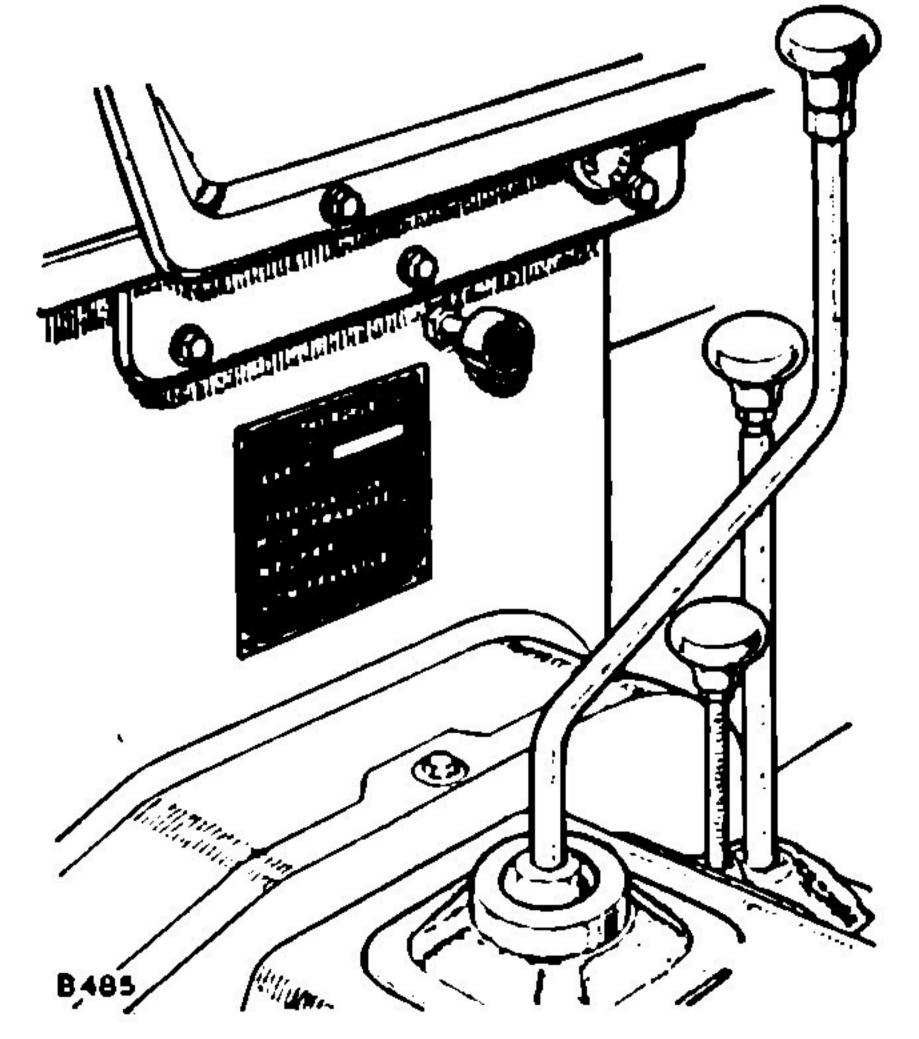


Fig. 1. Vehicle serial number.

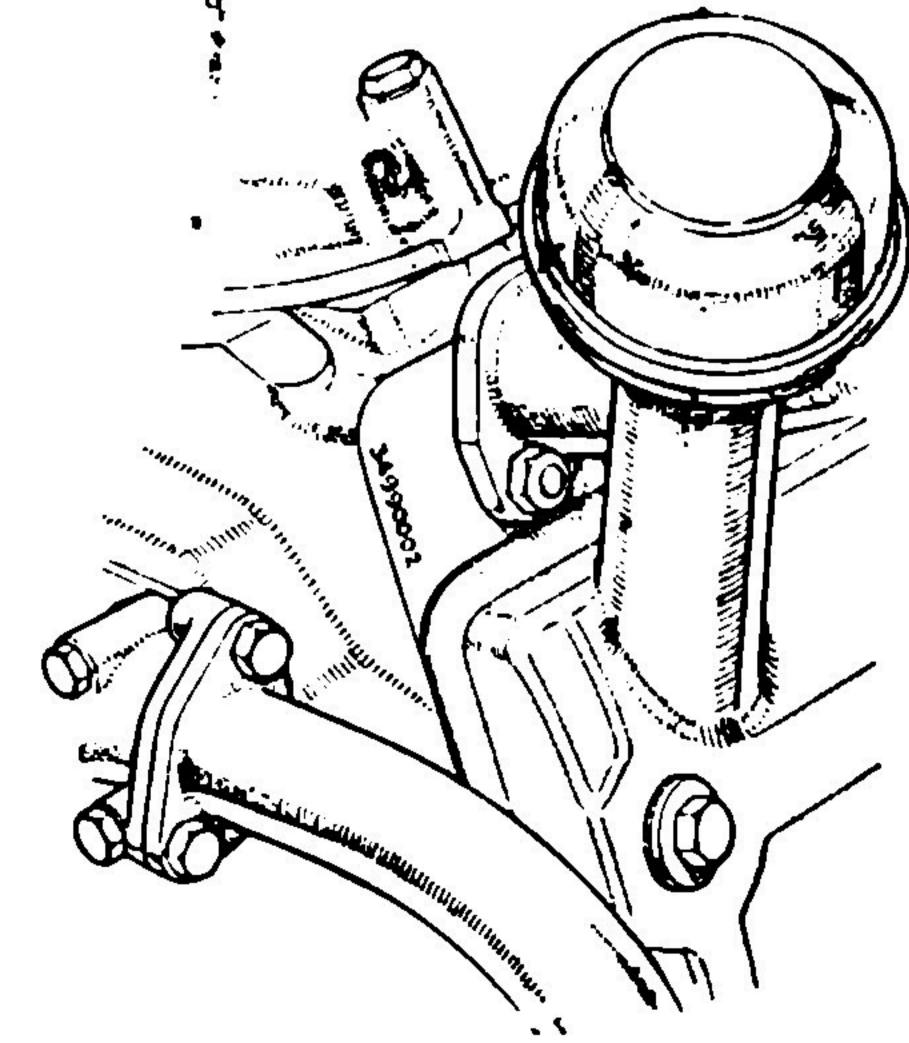


Fig. 2 Engine serial number.

The engine serial number, which need not be quoted in correspondence unless specifically asked for, is stamped on the left-hand side of the cylinder block at the front.

Other units bear serial numbers as detailed below, but they should not be quoted unless specifically requested:—

Gearbox number: Right-hand side of gearbox casing at rear.

Rear axle: On top of axle casing on left-hand side.

Front axle: On top of axle casing on left-hand side.

NOMENCLATURE.

To cater for both right- and left-hand drive models, reference is made throughout the text to the "left-hand" and "right-hand" sides of the vehicle, rather than to "near-side" and "off-side". The "left-hand" side is that to the left hand when the vehicle is viewed from the rear; similarly "left-hand drive" models are those having the driving controls on the left-hand side, again when the vehicle is viewed from the rear.

In some instances the abbreviation "L.H.D." is used to denote left-hand drive and "R.H.D." for right-hand drive.

Horse-power figures are quoted in British units.

SPECIFICATION.

It will be realised that from time to time alterations in design and in the make of various accessories occur and this instruction manual, while being kept up-to-date as far as possible, is not to be taken as a standard specification. The specification may be altered at any time, without incurring any obligation to incorporate such alteration in vehicles already delivered.

GENUINE ROVER PARTS.

All Rover owners should recognize the importance which attaches to the use of only GENUINE ROVER PARTS or ROVER APPROVED PARTS when repair or maintenance work is being carried out on their cars.

Rover parts are produced to the same high standard as those parts built into the car in its original production, and for this and other reasons it is in their interests that Rover owners should insist that only GENUINE ROVER PARTS or ROVER APPROVED PARTS are fitted to their cars.

THE ROVER CO. LTD., SOLIHULL, WARWICKSHIRE, ENGLAND.

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GENERAL DATA

ENGINE		•
Roce		77.8 mm. (3.063 in.)
Stroke		105 mm. (4.134 in.)
Number of cylinders	••••	4
Cylinder capacity		1997 c.c. (121.8 cu.in.)
Compression ratio		6.7-1. Copper and asbestos gasket
		6.9–1. Corrugated steel gasket
R.A.C. rating		15 H.P.
RHD		52 at 4,000 R.P.M.
T. Tariman togano		101 lb./ft. (14 mKg.) at 1,500 R.P.M.
		1, 3, 4, 2
Caralia a alama		14 mm. with suppressors
C 1		.029 to .032 in. (0,75 to 0,80 mm.)
Sparking plug point gap Distributor contact breaker gap		.029 to .032 in. (0,73 to 0,80 inin.) .014 to .016 in. (0,35 to 0,40 mm.)
		10° B.T.D.C.
Tappet clearance—inlet		.010 in. (0,25 mm.) Engine cold or at .012 in. (0,30 mm.) running temperature
,, —exhaust		
Valve timing (No. 1 exhaust valve pe	•	
Number of crankshaft bearings	• • •	
", camshaft bearings	• • • •	
Vibration damper	• • • •	Integral with fan driving pulley
Valve gear—inlet		Overhead operated by followers and push rods
,, ,, —exhaust		Side operated by direct rockers
Oil pressure	•••	55 to 65 lb./sq.in. (3,8 to 4,6 kg./cm.²) at 30 m.p.h. (50 k.p.h.) in top gear with engine warm
Lubrication	••••	Full pressure
Oil filter—internal		Gauze pump intake filter in sump
,, ,, —external		Full-flow filter
Mountings		Four-point rubber
CLUTCH		
Type		Single dry plate 9 in. (230 mm.) diameter
Adjustment	••••	in. (20 mm.) free movement at pedal pad
		Land the control of t
MAIN GEARBOX		
1		Cinale beliegt sometoms mech with avaches mech en sen end shied
Type	••••	Single helical constant mesh with synchro-mesh on top and third speeds
		specus
TRANSFER BOX		
		Two good eduction on main acorban and
Type		Two speed reduction on main gearbox output
Front wheel drive	• • • •	Two/four wheel drive control on transfer box output
PROPELLER SHAFTS		
Туре		Open type to both axles
REAR AXLE	•3	
		Spiegl harrel . gami flagging shafes
Type Ratio	••••	Spiral bevel; semi floating shafts
Ratio	••••	4.7–1
FRONT AXLE		
Differential		Spiral bevel
Front wheel drive		Enclosed universal joints
Ratio		4.7–1

GEAR RATIOS

13

GEAR RATIOS			
Main gearbox:			Top Direct Third 1.377-1 Second 2.043-1 First 2.996-1 Reverse 2.547-1
Transfer gearbox:			High transfer 1.148-1 Low transfer 2.888-1
Overall ratio (final dri	ve)		
			In High Transfer In Low Transfer
Top Third Second First Reverse			5.396-1 13.578-1 7.435-1 18.707-1 11.026-1 27.742-1 16.171-1 40.688-1 13.745-1 34.585-1
Petrol pump Carburetter Air cleaner Cilter		• • • •	Electric Down-draught type Oil bath type with integral centrifugal pre-cleaner Sediment bowl type
COOLING SYSTEM Type			Pump, fan and thermostat; pressurised
ELECTRICAL SYSTE	M		
Type Noltage Sattery capacity Sgnition system Charging circuit		••••	Positive earth 12 51 A.H. Coil Compensated voltage control
Road springs Hydraulic dampers			Semi-elliptic leaf Telescopic; non-adjustable
RAKES Foot brake—Land-Rover ,, ,, —Land-Rover Hand brake	107 and 109	•••	Hydraulic, 10" brake drums Hydraulic, 11" brake drums Mechanical on transfer box output shaft
TEERING	*		
6 and 107 type 8 and 109 type			Worm and nut. Ratio: 15-1 Recirculating ball. Ratio: straight ahead 15.6-1 full lock 23.8-1
ront wheel toe-in		••••	3/64 to 3/32 in. (1,2 to 2,4 mm.)
Camber angle Caster angle		••••	1 ½ 3°

WHEELS

Type 16 in. well-base or divided

TYRES

Size 6.00-16, 6.50-16 or 7.00-16 (see Page E-28)

Pressures See Page E-29

CAPACITIES	•			Imperial Unit	U.S. Unit	Litres
Engine sump oil Extra when refillin Air cleaner oil Main gearbox oil Transfer box oil Rear differential Front differential Swivel pin housing of Fuel tank Cooling system	g after	fitting nev	v filter	10 pints 1 pint 1½ pints 2½ pints 4½ pints 3 pints 1 pint 10 gallons 17 pints	12 pints 1.2 pints 2 pints 3 pints 5½ pints 3½ pints 1.2 pints 1.2 pints 12 gallons 20½ pints	5,5 0,85 1,5 2,5 1,75 1,75 0,5 45 9,75

DIMENSIONS	86 and 88 Basic		7 8538	nd 109 sic	=988	nd 88 Wagon	Station Wagon	
	British	Metric	British	Metric	British	Metric	British	Metric
Overall length Overall width Overall unladen height,		3,58 m. 1,59 m.	173 $\frac{1}{2}$ in. 62 $\frac{9}{16}$ in.	4,41 m. 1,59 m.	140 $\frac{3}{4}$ in. 62 $\frac{9}{16}$ in.	3,58 m. 1,59 m.	173 $\frac{1}{2}$ in. 62 $\frac{9}{16}$ in.	4,41 m. 1,59 m.
	50 N AGO 504 N	1,93 m.	83½ in.	2,12 m.				
hood down, screen up Overall unladen height,	68 in.	1,73 m.	•					
hood down, screen down Overall unladen height, with truck cab or hard	57½ in.	1,46 m.			<u> </u>			
	77 in.	1,96 m.	78 in.	1,98 m.	77 in.	1,96 m.	78 in.	1,98 m.
	86 in.	2,18 m.	107 in.	2,72 m.	86 in.	2,18 m.	107 in.	2,72 m.
models)	109 in. 50 in.	2,77 m. 1,27 m.	88 in. 50 in.	2,23 m. 1,27 m.	109 in. 50 in.	2,77 m. 1,27 m.
tyres), 86 models Turning circle (6.00-16	37 ft.	11,3 m.			37 ft.	11,3 m.		
tyres), 88 models Turning circle (7.00-16 tyres), 86 and 107	41 ft.	12,5 m.		·	41 ft.	12,5 m.		•
	40 ft.	12,2 m.	48-49 ft.	14,63- 14,92 m.	40 ft.	12,2 m.	48-49 ft.	14,63- 14,92 m.
Turning circle (7.00-16 tyres), 88 and 109 models	43 ft.	13,1 m.	50 ft.	15,25 m.		13,1 m.		
Unladen ground clear- ance, under differen-		1.7,1 111.	JU 11.	1,2,2,3 111.				
tials (6.00-16 tyres) Unladen ground clear- ance, under differen-	8 in.	203 mm.			8 in.	203 mm.		
tials (7.00-16 tyres)	8 ³ / ₄ in.	222 mm.	8¾ in.	222 mm.	8¾ in.	222 mm.	8¾ in.	222 mm.

DIMENSIONS contd.—	86 and 88 Basic		107 an Bas	T Arts	86 and 88 Station Wagon		107 Station Wagon	
	British	Metric	British	Metric	British	Metric	British	Metric
Weight (running, with	2,678 lbs.	1.215 kg.	3,018 lbs.	1.369 kg.	2,906 lbs.	1.318 kg.	3,398 lbs.	1.541 kg.
Weight (maximum ap-	2,740 lbs.	1.243 kg.	3,080 lbs.	1.397 kg.	2,968 lbs.	1.346 kg.	3,460 lbs.	1.569 kg.
Weight (maximum ap-	*4,190 lbs.	*1.900 kg.	5,185 lbs.	2.354 kg.	*4,190 lbs.	*1.900 kg.	5,060 lbs.	2.294 kg.
proved gross load, cross country) Maximum approved pay					3,990 lbs.			
load (normal roads)	900 900	-	Drive		*7 persons		10 persons, or 6	
	passeng 1,000 lbs.		passeng 1,500 lbs.		200 lbs.		_	s and 317,5 kg.
Maximum approved pay	1,000 103.	TJU Ng.	1,500 103.	oro ng.	200 103.	J IIIS.	100103.	J11,J115.
load, cross country	Drive	r, two	Drive	r, two	5 per	sons	8 perso	ns, or 6
		ers and	passeng		an		3 - No. 101 Dis 2020	is and
	800 lbs.	363 kg.	1,200 lbs.	544 kg.	200 lbs.	91 kg.	400 lbs.	181,4 kg.
Maximum drawbar pull (dependent upon sur-								
face conditions)	1,200 to 2,000 lbs.	550 to 900 kg.	1,200 to 2,000 lbs.	550 to 900 kg.	1,200 to 2,000 lbs.	550 to 900 kg.		
Internal body dimensions								
—length	The state of the s	1,16 m.	72¾ in.	1,85 m.	45¾ in.	1,16 m.	76 in.	1,93 m.
Internal body dimensions —width		1,45 m.	57 in.	1,45 m.	57 in.	1,45 m.	57 in.	1,45 m.
Internal body dimensions			001					
—depth Internal body dimensions	_	362 mm.	20½ in.	520 mm.				
-height of wheelarch	8 11 in.	221 mm.	8 11 in.	221 mm.	8 11 in.	221 mm.	8 11 in.	221 mm.
Internal body dimensions—width of wheelarch		305 mm.	12 in.	305 mm.	12 in.	305 mm.	12 in.	305 mm.
Internal body dimensions —height floor to roof							47½ in.	

^{*} Maximum loads for cross country when heavy duty springs are fitted.

SECTION A

DESCRIPTION and DRIVING INSTRUCTIONS

CONTROLS AND INSTRUMENTS

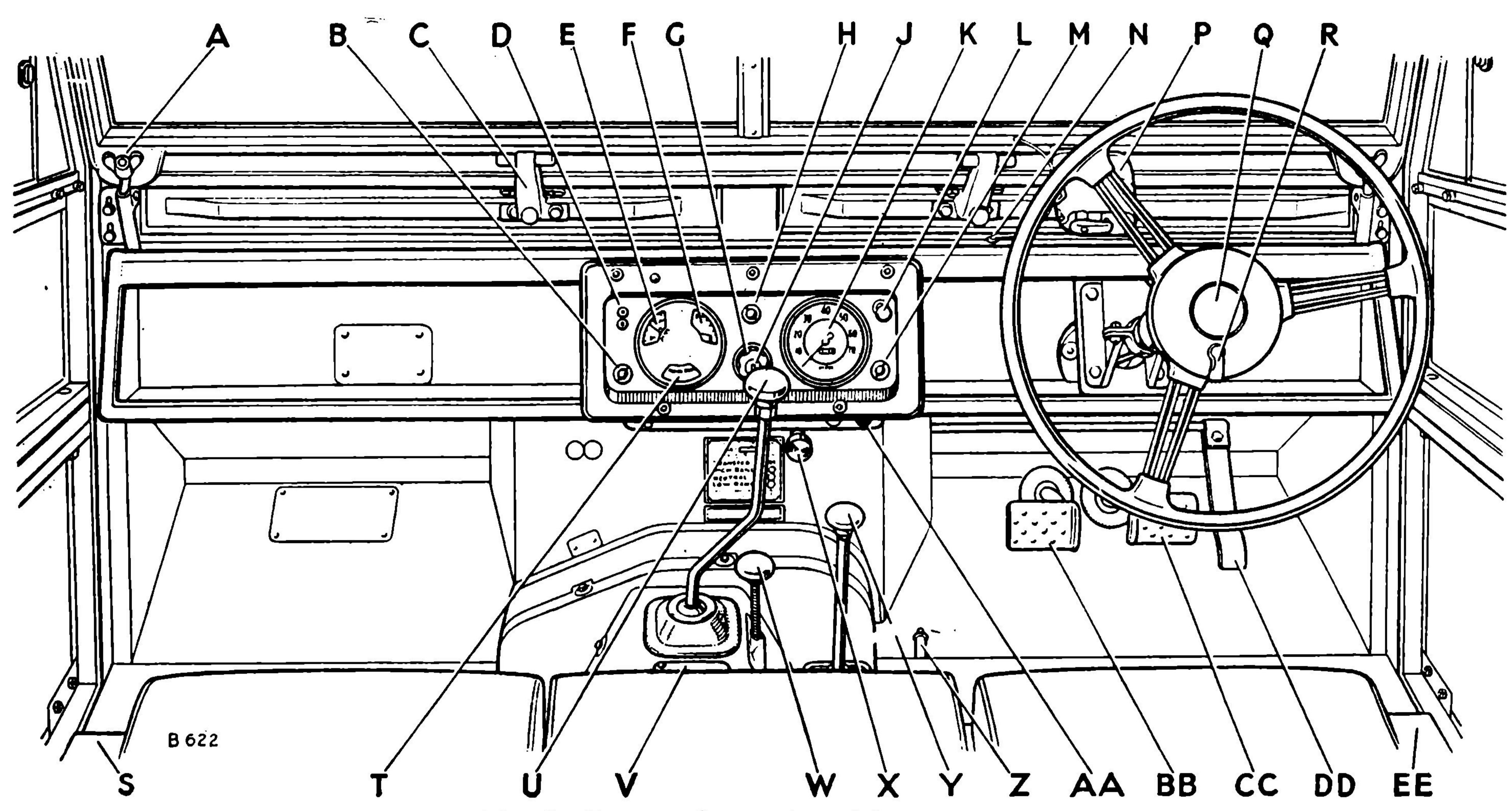


Fig. 3. Layout of controls and instruments.

- A-Wingnuts securing windscreen.
- B-Oil pressure warning light.
- ~ C-Windscreen ventilators.
 - D-Lead lamp socket.
 - E-Ammeter.
 - F-Petrol level gauge.
 - G—Lamp switch.
 - H-Ignition warning light.
 - J—Ignition switch.
 - K-Speedometer.

- L-Instrument panel light switch.
- M-Mixture control warning light.
- N-Wiper lead plug.
- P-Windscreen wiper.
- Q—Horn button (86 and 107).
- R—Headlamp dipper switch (86 and 107).
- S—Access to tool locker.
- T—Headlamp warning light.
- U—Main gear change lever. V—Access to gearbox oil filler.

- W—Front wheel drive control.
- X-Starter switch.
- Y—Transfer box lever.
- Z—Hand brake.
- AA-Mixture control.
- BB—Clutch pedal.
- CC—Brake pedal.
- DD-Accelerator pedal.
- EE—Access to petrol tank and brake fluid reservoir.

The controls and instruments are illustrated at Fig. 3; the layout is similar to that on a normal car, with the addition of transfer box and front wheel drive controls.

FOOT PEDALS.

Normal in position and operation.

IGNITION SWITCH AND KEY.

Integral with the lamp switch in the centre of the instrument panel; turn the key clockwise for "on".

The key is detachable.

With the ignition "off", only the following electrical equipment can be used:—

Driving lights (head, side and tail lamps), instrument panel lights, lead lamp socket and horn.

IGNITION WARNING LIGHT.

The red warning light at the top centre of the panel appears when the dynamo fails to charge or the dynamo charging rate is low. It will glow when the ignition is switched on and the engine is stationary or running slowly and will go out when the engine speed rises.

STARTER SWITCH.

On the dash panel below the instrument panel; to operate, press and release as soon as the engine fires.

MIXTURE CONTROL.

Marked "Cold Start" and mounted on the dash panel below the speedometer. See Page E-13 for operation.

MIXTURE CONTROL WARNING LIGHT.

Action of the amber warning light at the bottom right-hand corner of the panel is described on Page E-13.

OIL PRESSURE WARNING LIGHT.

The green warning light at the bottom left-hand corner of the panel glows when the engine oil pressure drops below a safe figure. It will light up when the engine is stationary and fade out when the engine starts and the oil pressure builds up to normal. See Page E-19 for further details.

HAND BRAKE.

Protrudes through the front of the seat box. To release the brake, pull upwards slightly, depress the button in the top of the hand grip and push down as far as possible; to apply the brakes, pull the lever upwards.

HORN.

86 and 107

Operated by the push button in the centre of the steering wheel.

88 and 109

The horn push button is housed on an extension arm attached to the steering column.

AMMETER.

The ammeter, in the multiple gauge, indicates the charging or discharging rate of the battery; usually a charge reading of three or four amperes will be shown.

When starting from cold, the charge reading will rise to a steady maximum, remain constant for a short while and then fall to a steady charge most suitable for the particular state of charge of the battery.

PETROL LEVEL GAUGE.

The petrol level gauge, in the multiple panel, only operates with the ignition "on". This gauge is not a precision instrument and cannot be used to derive petrol consumption figures; such tests must be made with an auxiliary tank of known size.

INSTRUMENT PANEL LIGHT SWITCH.

The push-pull switch controlling the panel lights, in the top right-hand corner of the panel, is only operative with the lamp switch at S or H.

WINDSCREEN WIPER SWITCH.

To set the wiper in operation, pull out the blade lever, turn it to clear the switch lever and turn the latter through 90°. To park the blade, reverse these operations.

LAMP SWITCH.

Turn the rotary lamp switch to the required position: OFF, S (side, tail and rear number plate lamps) or H (as S plus headlamps).

NOTE.—On North American vehicles, the side lamps are extinguished when the switch is moved to H and vice versa.

HEADLAMP DIPPER SWITCH.

86 and 107

Operation of the dipper switch, on the steering wheel boss, replaces the primary filaments in both headlamps by secondary "out-of-focus" filaments directed towards the near-side of the road.

88 and 109

Fitted with a foot operated switch to the left of the clutch pedal.

HEADLAMP WARNING LIGHT.

The small red warning light at the bottom centre of the multiple gauge glows when the primary headlamp beams are in use; its purpose is to remind the driver to switch off or dip the headlamps on entering a brightly-lit area.

LEAD LAMP SOCKET.

In the top left-hand corner of the instrument panel are a pair of sockets which can be used either for a lead lamp or trickle battery charger; the red socket is earthed.

MAIN GEAR CHANGE LEVER.

See Page E-14 for gear changing instructions.

TRANSFER BOX LEVER.

The lever controlling the two-speed transfer box is situated to the right of the gearbox cover; it must be pushed right forward for normal high ratio work. See Page E-14 for instructions on use of the transfer box.

FRONT WHEEL DRIVE CONTROL.

Operation of the yellow knob, protruding from the gearbox cover, controlling the front wheel drive is described on Page E-14.

STANDARD BODY FITTINGS

The main characteristics of the Land-Rover models are brought out at Figs. 4, 5 and 6, but the following points may require explanation to ensure maximum utility from the vehicle.

LOCKING THE VEHICLE.

To protect the vehicle against theft, the ignition key should always be removed when parking. As an additional precaution, the distributor rotor may be removed (see Page E-34) or the petrol tap on the sediment bowl turned "off" (see Page E-27).

When private locks and window catches are fitted, these should be secured when the vehicle is left unattended.

BONNET.

The bonnet top panel is secured by a spring fastener on each side. To open, release the fasteners and raise the panel until the jointed prop rod can be pulled slightly forward at the joint.

The panel can be removed from the vehicle by withdrawing one of the split pins securing the proprod and sliding off its hinges on the dash.

FRONT BUMPER AND REAR DRAWBAR.

Attached by bolts and readily detachable for attention to accidental damage.

NOTE. The rear drawbar is an Extra for late models.

TOWING ATTACHMENTS.

Early models.

Two forms of towing attachment are supplied as standard equipment. The towing plate can be

fixed to the rear drawbar, by means of the bolts provided, at any point along its length. As it is cranked and distance pieces are provided with the bolts, judicious assembly enables the towing hole to be arranged at varying heights from the ground, to suit a variety of appliances.

The towing jaw can be bolted to the centre of the rear chassis cross-member, using the bolts provided, and can be used for towing a trailer or other equipment.

Late models.

An attachment bracket and towing jaw are supplied as standard equipment.

The towing jaw can be bolted directly to the centre of the rear chassis cross-member and can be used for towing a trailer or other equipment.

An alternative lower position is provided by fixing the attachment bracket to the centre of the rear chassis cross-member. The towing jaw can then be bolted to the two lower holes in the attachment bracket.

Alternative towing attachments and a trailer lamp lead are also available (see Section C).

SEATS.

Each seat cushion is detachable by releasing the securing strap at the front and withdrawing the retaining tongues from the slots in the back-rest panel.

Except on the de-luxe Land-Rover 107 and 109, the seat backs are secured in the upright position to the backrest panel by straps; if the vehicle is parked in inclement weather without a covering, they may be folded down on to the seat cushions.

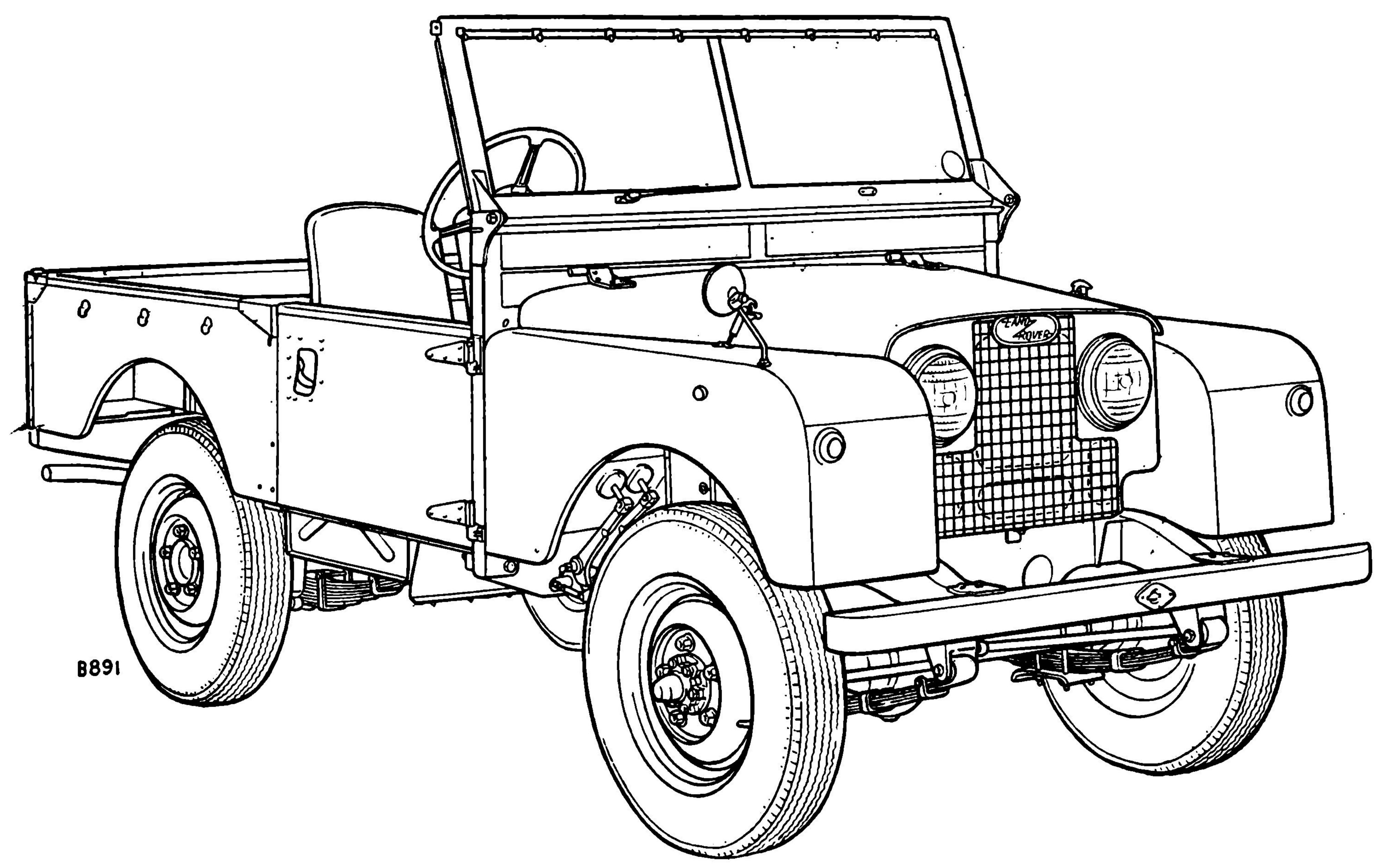


Fig. 4. Front view-Land-Rover 86 and 88.

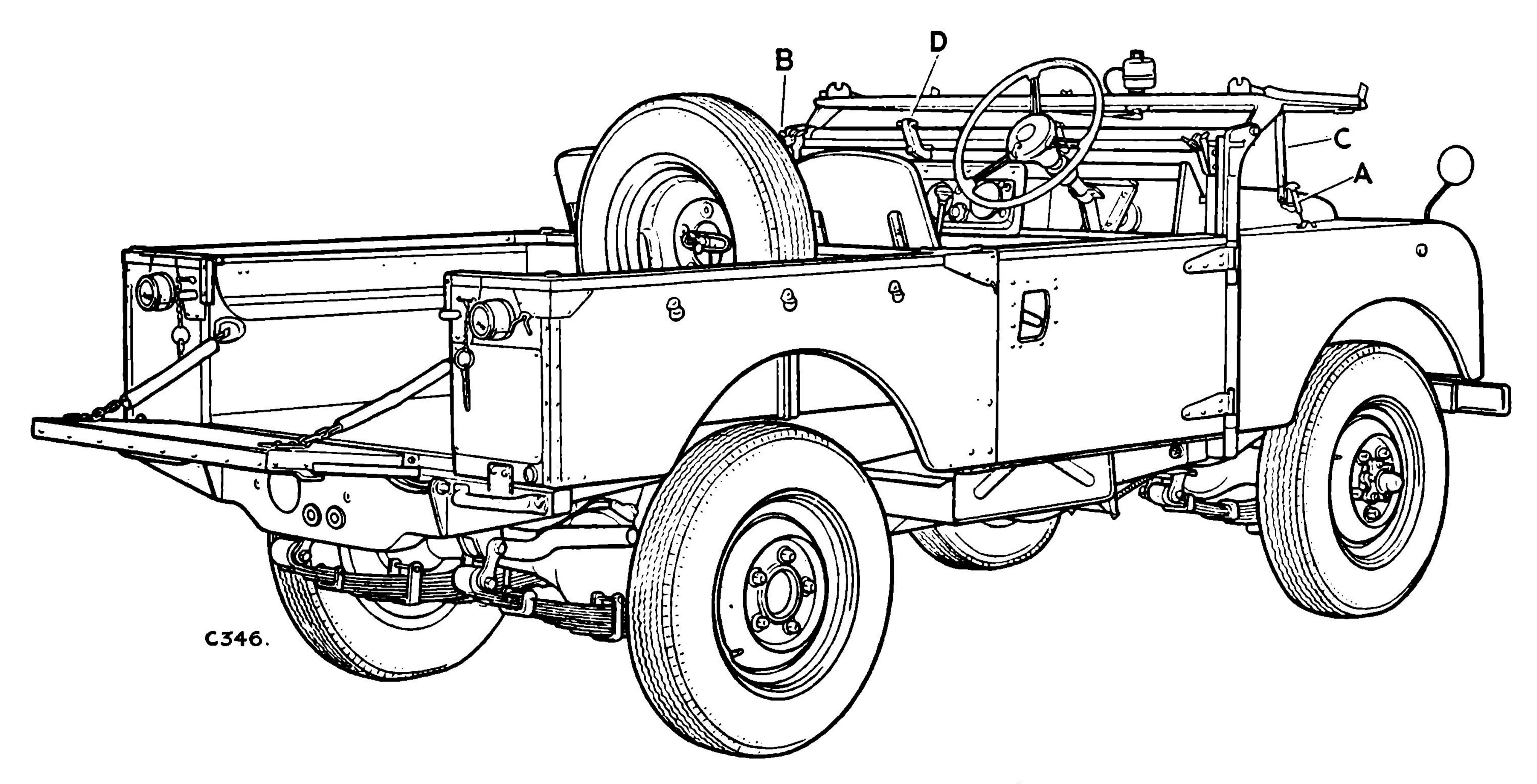


Fig. 5. Rear view-Land-Rover 86 and 88.

A—Bonnet fastener.

B-Windscreen-securing wingnut.

C-Windscreen stay.

D-Ventilator fastener.

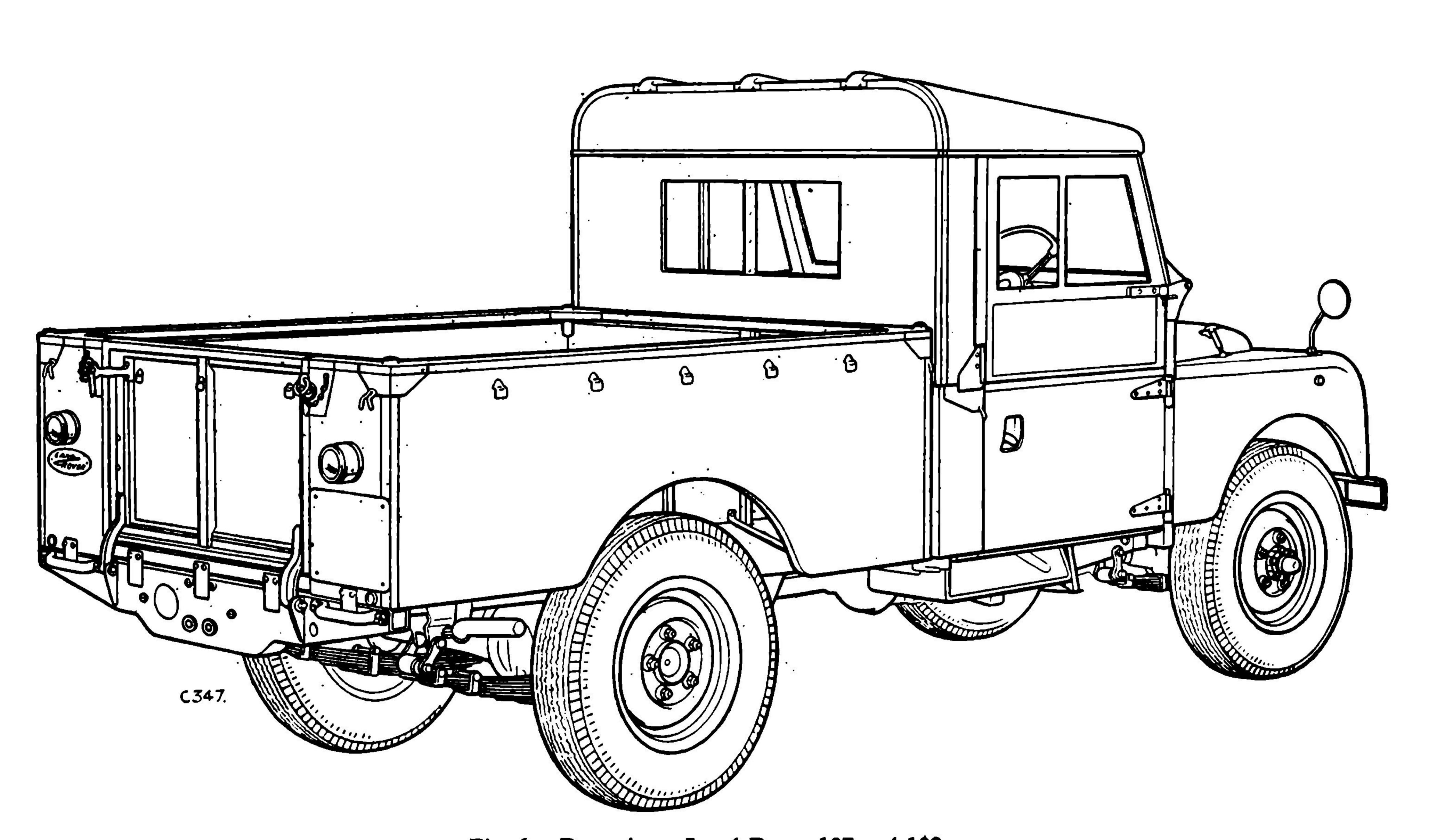


Fig. 6. Rear view—Land-Rover 107 and 109.

LOCKER LIDS.

The right-hand locker lid, under the seat cushion, encloses the petrol tank and filler and the brake fluid reservoir (see Page E-25); a similar locker on the left-hand side is used as a tool box.

TOOL STOWAGE.

Small tools are carried in the left-hand locker, under the seat cushion. Except on some special vehicles, the starting handle and lifting jack handle extension are secured in clips on the seat back-rest panel and are accessible with the seat backs lowered.

WINDSCREEN.

On canvas covered vehicles only, provision is made for folding the windscreen down on to the bonnet as follows:—

Remove the hood then disconnect the windscreen wiper lead at the plug adjacent to the wiper motor and release the bonnet fasteners. Slacken the wingnuts at the bottom corners of the windscreen. Lower the windscreen, slacken the support stays (at the top of the windscreen frame) and rest them on the bonnet staples; secure the windscreen and bonnet with the bonnet fasteners.

WINDSCREEN VENTILATORS.

The two ventilators in the windscreen frame may be opened independently by pulling down each fastener; to close, pull the fastener up and "over centre" as far as possible. The knurled screw on each fastener rigidly controls the degree of opening with the fastener pulled right down; to increase the opening, turn the screw anti-clockwise and viceversa. Use of the ventilators will be found advantageous when traversing dusty roads, as they greatly reduce the amount of dust blown into the vehicle from the rear.

TAILBOARD.

In the horizontal position, the tailboard is retained by two chains. To remove the tailboard completely, remove the split pin and plain washer from one of the hinges, unhook the chains and slide it off its hinges.

SIDESCREENS.

The sidescreens are readily detachable after removing the securing nuts and washers.

DOORS.

To remove the doors (disconnect check straps if fitted) swing them fully open and lift complete assembly clear of hinge pivots.

PETROL FILLER.

The petrol filler cap is located beneath the locker lid on the right-hand side of the seat box, accessible after the right-hand seat cushion is removed. When the cap is removed a telescopic tube may be drawn out of the tank neck and locked by a slight anti-clockwise movement, to facilitate filling. The tank capacity is 10 Imperial gallons (45 litres).

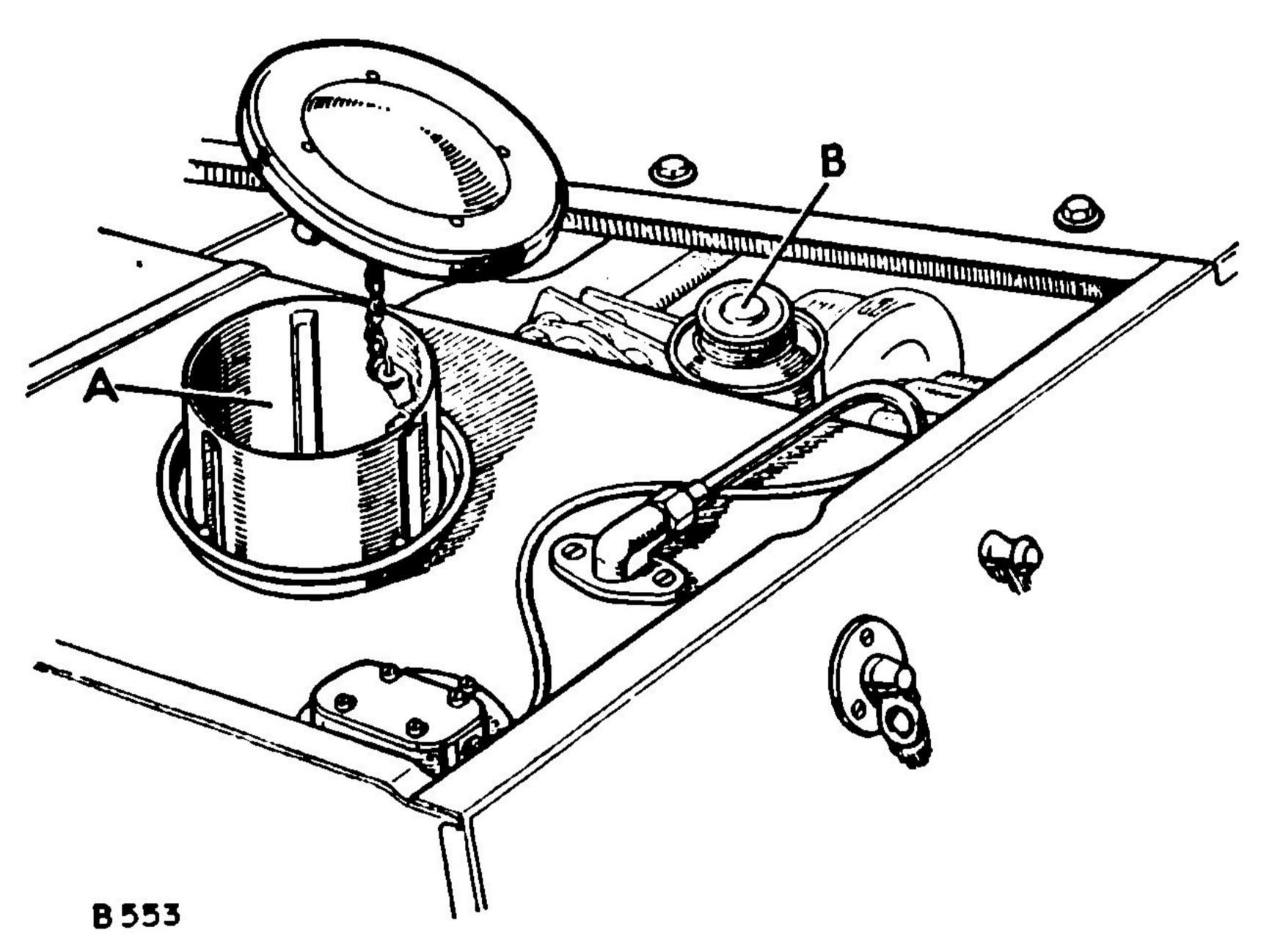


Fig. 7. Petrol filler and brake fluid tank.

A-Petrol filler.

B-Brake fluid supply tank.

Any good brand of petrol of approximately 80 octane rating is suitable for this vehicle. If it is desired to run the vehicle on a fuel having an octane rating of substantially less than 80, the ignition may require slightly retarding to avoid pinking (see Page E-21—Ignition timing).

RADIATOR FILLER.

Access to the radiator filler is gained by lifting the bonnet panel.

The cooling system is pressurised and great care must be taken when removing the radiator filler cap, especially when the engine is hot, to avoid steam which may be blown out with considerable force.

When removing the filler cap, first turn it anticlockwise to the stop and allow all pressure to escape, before pressing it down and turning further in the same direction to lift it off.

The correct water level is to the bottom of the filler neck; the total capacity of the system is 17 Imperial pints (9,75 litres).

NOTE. Use soft water wherever possible; if the local water supply is hard, rain or distilled water should be used.

STARTING PROCEDURE

Before attempting to start the engine, read the following notes concerning the mixture control and accelerator.

MIXTURE CONTROL.

The mixture control has three positions and there is no graduation between them. The mixture is normal with the control pushed right in; the warming-up position can be located by pulling out the control about half-way until a light click is felt, and the rich or starting position is with the control pulled right out.

On no account must the control be set in any position between these three settings. When the engine has started, the control must be returned to the normal position as soon as possible, consistent with even running.

ACCELERATOR.

The carburetter is fitted with an accelerator pump, so that when the accelerator is fully depressed, an extra rich mixture is provided to assist acceleration. As this is not required when starting the engine, except under abnormal starting conditions, the accelerator must not be touched when starting with a cold engine.

It may assist starting a hot engine if the accelerator is depressed half-way and then released as soon as the engine fires.

Never pump the accelerator pedal under any circumstances.

STARTING THE ENGINE.

- 1. Ensure that the main gear lever is in the neutral position.
- 2. Ensure that the transfer box lever is in high ratio position, i.e., right forward.
- 3. Start the engine as follows:—
 - A. Engine cold.
 - (i) Pull the mixture control right out.
 - (ii) Keep the foot clear of the accelerator.
 - (iii) Switch on the ignition, check that the green oil pressure and red ignition warning lights appear.
 - (iv) Press the starter button, when the engine should start after a turn or two.

- B. Engine warm or hot.
 - (i) Set the mixture control in the mid-way position if the engine is warm or right in if the engine is hot.
 - (ii) Depress the accelerator half-way.
 - (iii) Switch on the ignition, check that the green oil pressure and red ignition warning lights appear.
 - (iv) Press the starter button.
 - (v) Remove the foot from the accelerator as soon as the engine fires.

NOTE. If the engine makes a false start, allow the starter to come to rest before pressing the starter button again. Should the engine fail to start after two or three attempts, investigate and correct the cause before the battery is run down needlessly.

WHEN THE ENGINE STARTS.

Except under conditions of extreme cold, push in the mixture control from the rich to the warm-up (mid-way) position within a few seconds of the engine starting. This period may have to be extended if conditions are severe, but should never exceed a minute or so.

Do not race the engine; drive away at moderate speed immediately after starting, so stimulating lubrication of the cylinder walls as the engine warms up. Continue with the control in the mid-way position until the engine temperature has risen sufficiently to allow the knob to be pushed right in to the normal position.

The appearance of the AMBER WARNING LIGHT on the instrument panel will indicate that the control has been left out inadvertently and must be pushed in at once.

WARNING LIGHTS.

Like all mechanical devices, the mixture control warning system is not completely fool-proof and the responsibility for pushing in the mixture control rests with the driver, especially as the warning light may never appear owing to bulb failure. Suspected bulb failure may be confirmed by pulling out the mixture control momentarily when the engine is hot, when the bulb should be illuminated.

To guard against bulb failure in the oil pressure and ignition warning lights, a check should be made that the bulbs glow each time the ignition is switched on.

GEAR CHANGING INSTRUCTIONS

MAIN GEAR LEVER.

The positions of the main gear change lever are marked on the lever knob. It should be noted that the only reverse stop is a spring in the selector mechanism which tends to hold the lever away from the reverse selector shaft.

GEAR CHANGING.

Gear changing on the main gearbox is carried out in the normal manner. Synchro-mesh gears are provided for changing from second to third, third to top and top to third and in these cases single declutching may be used; for all other changes, it is advisable to use the double de-clutch method.

Until experience is gained under differing operating conditions, the following speeds may be used as a guide when changing gear:—

	High ratio	Low ratio		
First to second	5-8 m.p.h. (8-15 k.p.h.)	Within two or three vehicle lengths of starting.		
Second to third	15 m.p.h. (25 k.p.h.)	6 m.p.h. (10 k.p.h.)		
Third to top	20-25 m.p.h. (35-40 k.p.h.)	10 m.p.h. (15 k.p.h.)		

TRANSFER BOX LEVER.

The transfer box gives two ratios in the output from the main gearbox, termed "high" and "low", thus giving a total of eight forward and two reverse speeds in all. It is controlled by the lever to the right of the gearbox cover; this has three positions—right forward for high ratio, mid-way for neutral and right back for low ratio.

For normal usage and road work the lever should be in the high position. Low ratio is used when the vehicle is to be operated on heavy ground and for heavy pulling. The neutral position mid-way between "high" and "low" is quite definite and is used with the power take-off for stationary work; the vehicle cannot be driven with the lever in neutral.

TRANSFER GEAR CHANGING.

Changing from HIGH to LOW transfer ratio should only be attempted when the vehicle is stationary. The engine may be left running, but the main gear lever must be in the neutral position. Depress the clutch pedal and pull the transfer box lever right back; release the clutch. Should there be any hesitation in the gear engaging, do not force the lever. With the engine running, engage a gear in the main gearbox and let in the clutch momentarily; then return the main gear lever to neutral and try the transfer control again.

Changing from LOW to HIGH transfer ratio may be accomplished at any time, regardless of vehicle speed. Release the accelerator pedal, depress the clutch pedal and push the transfer box lever right forward, pausing slightly in the neutral position; let in the clutch.

FRONT WHEEL DRIVE CONTROL.

The vehicle may be operated in two-wheel or four-wheel drive as required; the drive to the front wheels is through a dog-clutch in the casing on the front of the transfer box, controlled by the yellow knob on the gearbox cover.

When operating the vehicle in HIGH transfer ratio, the drive is normally to the rear wheels only; should conditions call for drive on all four wheels, i.e., when traversing soft country or descending a steep, muddy gradient, the front wheel drive should be engaged by pressing down the knob on the gear-box cover. In order to regain two-wheel drive, on resuming hard surface travelling, stop the vehicle, engage LOW transfer ratio and return to HIGH transfer ratio, when the dog-clutch is automatically disengaged and the control knob returns to the "up" position.

When operating the vehicle in LOW transfer ratio, four-wheel drive is automatically engaged at the same time as LOW ratio is selected; the front wheel drive is automatically disengaged on regaining HIGH transfer ratio.

RUNNING-IN THE NEW VEHICLE

RUNNING-IN PERIOD.

Progressive running-in of a new vehicle is of the utmost importance and has a direct bearing on durability and smooth running throughout its life.

The running-in period is 500 miles (750 km.), during which time 35-40 m.p.h. (55-65 k.p.h.) in high transfer ratio top gear should not be exceeded. The engine must not be allowed to labour at any time and full use should be made of the indirect gears to ensure that full throttle is not used even to achieve 40 m.p.h. (65 k.p.h.). If the vehicle is used in low transfer ratio when new, 15 m.p.h. (25 k.p.h.) should not be exceeded in top gear. Corresponding maximum speeds should be used in the lower gears.

Thereafter, maximum speeds may be increased gradually, but the vehicle should not be driven at prolonged high speeds until it has done 1,000 miles (1.500 km.).

Never race the engine when cold at any time during the life of the vehicle.

UPPER CYLINDER LUBRICATION.

The use of an upper cylinder lubricant is advisable during the running-in period; recommended lubricants appear on Page E-39.

It should be added to the tank before filling with petrol to ensure thorough mixing, in the proportion of one fluid ounce to four gallons of petrol (three centilitres to twenty litres).

The addition of upper cylinder lubricant is not recommended after the engine has been run in, as it tends to increase combustion chamber deposits.

LUBRICATION AND FREE SERVICE.

Except under tropical or extreme winter conditions, it is recommended that the oil placed in the engine, gearbox and axles on initial assembly be used for the first 750 miles (1.000 km.), when it should be changed in accordance with the first service inspection detailed on the Free Service Card supplied with the vehicle.

Under the exceptional conditions stated, the oils should be changed on receipt of the vehicle to the correct grade and again at the free service stage.

A second service inspection is carried out by the dealer at 1,500 miles (2.500 km.).

SPARE WHEEL.

On the Land-Rover 86 and 88, the spare wheel is carried behind the seat backrest and secured by a clamp and wing nut, it can also be fitted to the bonnet panel as an optional extra. (See page E-43).

On the 107 and 109, fittings to secure the spare wheel, either on the front panel of the rear body or on the bonnet, are supplied as standard equipment.

WHEEL CHANGING.

- 1. Slacken the double-ended wheel securing nuts.
- 2. Jack up the corner of the vehicle, fitting the jack under the road spring below the axle casing.
- 3. Remove the nuts and withdraw the wheel over the studs.
- 4. If available, place a drop of oil on the stud threads, to assist in subsequent removal.
- 5. Fit the new wheel, with the "V" tread directed to the front at the top; tighten the nuts securely and lower the vehicle to the ground.

WARNING. Do not touch the outer ring of nuts on divided type wheels, unless the wheel is removed and the tyre fully deflated, or severe personal injury may result.

FREE SERVICE INSPECTIONS.

Rover Distributors/Dealers will give your Land-Rover two Free Service inspections, any oil used being charged for. This Service is provided on new Land-Rovers sold direct by Distributor/Dealer to the user, on completion of the first 750 miles (1.000 km.) and again after the first 1,500 miles (2.500 km.).

With the literature supplied with each new vehicle there is included a "Free Service Card" which details the items to be covered by each Service and two detachable Vouchers should be taken to the Distributor/Dealer as each Service becomes due.

The importance of regular and systematic maintenance cannot be too highly stressed and we strongly advise the Land-Rover owner to take advantage of these free service facilities which are offered by the Rover Organisation.

In the event of an owner residing some distance from the Rover Distributor/Dealer from whom the vehicle was purchased, it may be more convenient for him to have the two Free Service Inspections carried out elsewhere. Agreement can usually be reached with the "Vendors" of the vehicle to accept an Inter-Dealer charge at our agreed rates from another repairer for carrying out these services on their behalf, but the owner should confirm this arrangement with the "Vendors" of the car beforehand.

In the case of vehicles sold in the British Isles against a Home Delivery Order (for eventual export), it becomes necessary for the owner concerned to obtain the two Free Services from one of our Home Distributors or Dealers. The owner can obtain these facilities from any Rover Distributor or Dealer in the British Isles on presentation of the Service Vouchers. In these circumstances the Rover Company will accept responsibility for the Labour charges involved at our agreed Inter-Dealer Rates on receipt of any invoice from the Distributor/Dealer. The oil used will be charged to the owner.

SECTION B

ROUTINE MAINTENANCE and REPAIR WORK

SUMMARY OF POINTS REQUIRING MAINTENANCE ATTENTION

All items of regular or occasional maintenance are listed below in terms of mileage and operation hours which would apply in a temperate climate under clean working conditions. Climatic and operating conditions affect maintenance intervals to a large extent; in many cases, therefore, the determination of such intervals must be left to the good judgment of the operator, but the recommendations will serve as a firm basis for maintenance work.

If the vehicle is used almost exclusively in low transfer ratio or for stationary work, mileage is of no use whatever in deciding maintenance intervals; lubrication attention must then be based on operation hours.

To ensure that the correct procedure is followed as each item is dealt with, it is most important that attention be transferred in turn to the appropriate page as indicated. In addition, these notes concerning more frequent attention to certain important lubrication points should be read carefully to ensure long and efficient service from the vehicle.

Engine. Under severe conditions of mud or dust, the first and subsequent oil changes must be more frequent, even to the extent of a daily change. Under deep wading conditions through water carrying mud and grit, a daily oil change is essential.

Air cleaner. When the vehicle is used for dusty road or field work, attention must be more frequent and may involve a daily oil change; under extremely bad conditions, cleaning twice daily may be called for.

Gearbox, transfer box, differentials and swivel pin housings. It is essential to change oil much more frequently than indicated if the vehicle is operated under bad conditions, especially if deep wading is carried out.

Propeller shafts. Under tropical or severe conditions, particularly where sand is encountered, the sliding joints must be lubricated very frequently to prevent ingress of abrasive material.

USE ONLY THE RECOMMENDED LUBRICANTS LISTED ON PAGE E-39.

POINTS REQUIRING REGULAR ATTENTION

MONTHLY:

1. Tyres. Check tyre pressures. Inspect tyre treads (Page E-31).

EVERY 250 MILES (500 Km.) OR 10 OPERATION HOURS.

1. Engine. Replenish oil level in sump as necessary.

AT FIRST 750 MILES (1.000 Km.) OR 30 OPERATION HOURS.

1. Distributor or dealer will carry out the first service inspection as detailed on the Free Service Card.

EVERY 1,000 MILES (1.500 Km.) OR 40 OPERATION HOURS.

- 1. Battery. Check acid level (Page E-32).
- 2. Gearbox. Remove the drain plug from the bell housing and allow any oil to drain away (Page E-22).

AT FIRST 1,500 MILES (2.500 Km.) OR 60 OPERATION HOURS.

1. Distributor or dealer will carry out the second service inspection as detailed on the Free Service Card.

EVERY 3,000 MILES (5.000 Km.) OR 120 OPERATION HOURS.

- 1. ENGINE. Drain the sump and refill with fresh oil (Page E-19). Clean the breather filters (Page E-19).
- 2. ENGINE. Clean sparking plugs and reset gaps (Page E-21).
- 3. Gearbox. Replenish oil level as necessary (Page E-22).
- 4. Transfer Box. Replenish oil level as necessary (Page E-22).
- 5. FRONT AND REAR DIFFERENTIALS. Replenish oil levels as necessary (Page E-23).
- 6. SWIVEL PIN HOUSINGS. Replenish oil levels as necessary (Page E-24).
- 7. Steering Box. Replenish oil level as necessary (Page E-24).
- 8. Stering Ball Joints. Check that the rubber boots on the steering ball joints have not become dislodged or the joint damaged (see Page E-25).
- 9. Propeller Shafts. Lubricate the sliding joints and journals (Page E-23).
- 10. Foot Pedals. Lubricate (Page E-25).
- 11. Distributor. Lubricate (Page E-34).
- 12. Fuel System. Empty, clean and refill the air cleaner (Page E-28).
- 13. Wheels. Change round all wheels (Page E-31).

EVERY 6,000 MILES (10.000 Km.) OR 240 OPERATION HOURS.

- 1. ENGINE. Renew the external oil filter element (Page E-19).
- 2. ENGINE. Clean the oil pump intake filter (Page E-19).
- 3. Distributor. Clean and check contact points (Page E-34).

EVERY 9,000 MILES (15.000 Km.) OR 360 OPERATION HOURS.

- 1. Gearbox. Drain and refill with fresh oil (Page E-22).
- 2. Transfer Box. Drain and refill with fresh oil (Page E-22).
- 3. FRONT AND REAR DIFFERENTIALS. Drain and refill with fresh oil (Page E-23).
- 4. SWIVEL PIN HOUSINGS. Drain and refill with fresh oil (Page E-24).

EVERY 12,000 MILES (20.000 Km.) OR 480 OPERATION HOURS.

- 1. Front and Rear Axles. Check tightness of U bolts and spring clips (Page E-25).
- 2. Propeller Shafts. Check tightness of securing bolts (Page E-23).
- 3. Body. Check tightness of body securing bolts, wing bolts, etc.
- 4. Dynamo. Lubricate (Page E-33).

POINTS REQUIRING OCCASIONAL ATTENTION AS FOUND NECESSARY

- 1. COOLING SYSTEM. Replenish water level (Pages E-12 and E-29). Adjust san belt tension (Page E-29).
- 2. Brakes. Replenish fluid level in supply tank (Page E-25).
- 3. GENERAL. Apply a few spots of oil to all exposed joints such as throttle joints, clutch linkage, door locks and hinges, bonnet prop, etc. Inspect wiring and pipes for signs of chafing which might cause "shorts" or leaks.
- 4. Clutch. Adjust free pedal movement (Page E-21).
- 5. Fuel System. Clean sediment bowl (Page E-27). Clean pump and carburetter filters (Pages E-27 and E-28).
- 6. Engine. Adjust tappet clearances (Page E-21).

DECARBONISING

It is not possible to lay down a hard and fast rule concerning the mileage intervals at which the engine should be decarbonised and the valves ground in, for it is not actually necessary to carry out the operation until there is a "fall-off" in performance.

The point at which this condition is reached will vary under different conditions of service and some difficulty may be experienced in detecting it. Should this be the case, it is better either to depend upon mileage as a guide and decarbonise the engine at every 9,000-10,000 miles (15.000-16.500 km.) or 360 operation hours, or to seek advice from the nearest Rover distributor or dealer.

EXTRA EQUIPMENT REQUIRING REGULAR ATTENTION

Certain items of extra equipment (see Pages E-40 to E-50) require regular maintenance attention as follows:—

EVERY 40 OPERATION HOURS.

- 1. Rear Power Take-Off. Replenish oil level as necessary (Page E-47).
- 2. REAR PULLEY. Replenish oil level as necessary (Page E-48).
- 3. Engine Governor Replenish oil level as necessary (Page E-49)
- 4. Capstan Winch. Replenish oil level as necessary. Lubricate at nipples (Page E-50).

EVERY 1,000 MILES (1.500 Km.).

1. Trailer. Lubricate at nipples. (Page E-51)

EVERY SIX MONTHS.

- 1. REAR POWER TAKE-OFF. Drain and refill with fresh oil (Page E-47).
- 2. REAR PULLEY. Drain and refill with fresh oil (Page E-48).
- 3. Power Take-Off Propeller Shaft. Lubricate (Page E-47).
- 4. Capstan Winch. Drain and refill with fresh oil (Page E-50).

LUBRICATION AND MAINTENANCE

GENERAL INSTRUCTIONS.

One of the most important factors in the performance and durability of any vehicle is its lubrication. The responsibility for correct lubrication attention rests mainly on the driver; for this reason, the relative instructions set out in this section of the manual should be followed carefully.

The instructions are complete and any part of the vehicle not specifically mentioned does not require routine attention in this respect.

The recommended lubricants are detailed on Page E-39; as a result of exhaustive tests, they have been found pre-eminently suitable for Land-Rovers and should be used whenever possible. In the interests of smooth and economic running, heavier grade oil should not be used; when ordering oil, the correct grade, as well as the make, should be clearly stated.

OIL ADDITIVES.

No responsibility can be taken for damage arising from the use of any additive to the recommended lubricants.

The oils selected are complete in themselves and afford every protection. A warning is necessary against the addition of any oils or other products, as these may materially impair the character of the lubricant in use.

ENGINE

ENGINE OIL CONSUMPTION.

The Rover Company feels that there are many owners who may not be fully aware of certain changes which have come about in engine design and manufacturing technique, and the characteristics of modern engine lubricants.

The Rover Company, in common with other manufacturers, expects from a new engine a definite consumption of engine oil.

It is usually a characteristic that in the early life of an engine the consumption of oil will be higher than subsequently, and it is quite normal for consumption figures to improve up to and even beyond 6,000 miles (9.600 km.).

The reason for the heavier consumption when new is that as the piston rings bed in so is the consumption reduced. This consumption of oil in the early stages of the engine's life is a desirable characteristic, aiding as it does the effective running in of pistons, rings and cylinder bores, resulting in subsequent longevity.

It should also be realised that with the trend towards modern thinner lubricants, which is in itself a highly desirable feature, there may be some tendency for the consumption also to be slightly increased. Owners when checking oil consumption should make quite sure that the check is made with the engine cold and the vehicle standing on level ground, otherwise a false reading may result.

Over-filling an engine with lubricating oil has no advantages and can quite easily result in a loss of lubricant, giving a completely misleading impression.

It is also unnecessary to top-up oil in the sump for every half-pint (0,25 litre) that may be consumed, but topping-up should not be delayed after the oil level has, or is likely to reach in the course of current running, the low mark on the dipstick.

ENGINE LUBRICATION.

OIL LEVEL.

Since a certain amount of oil is used up in proper operation of the engine, the oil supply must be replenished at intervals, in addition to periodic oil changes.

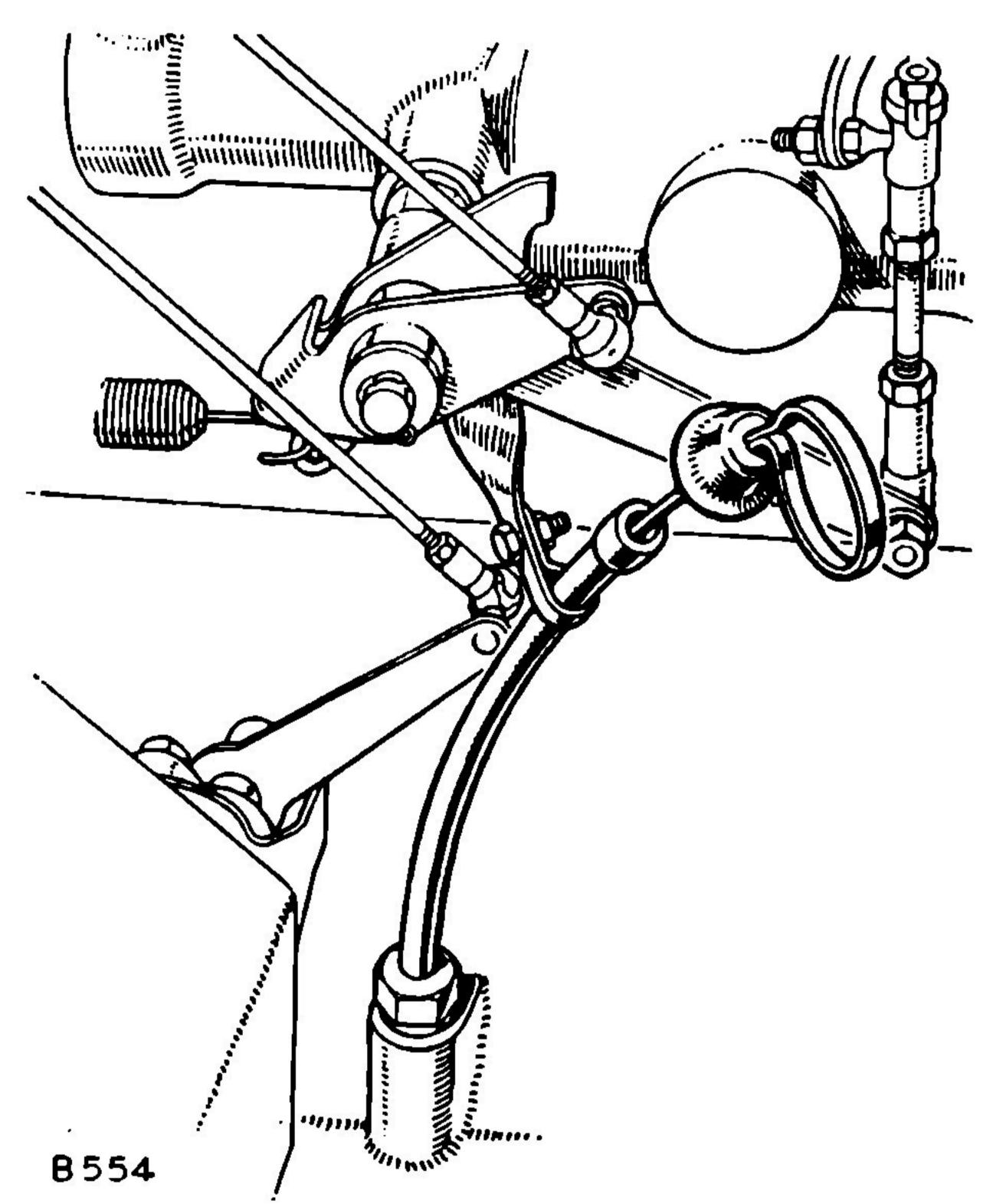


Fig. 8. Engine dipstick.

The oil level dipstick on the right-hand side of the engine, accessible when the bonnet panel is raised, carries two marks, H (High) and L (Low). The oil level must be maintained as near the H mark as possible and must never fall below the L mark. The oil filler is at the left-hand front corner of the engine. (See Fig. 11, Page E-20.)

To check the oil level, proceed as follows:—

Stand the vehicle on level ground and allow a few minutes for the oil to drain back into the sump from the valve gear, etc. Withdraw the dipstick upwards, wipe it clean, re-insert to its full depth and remove a second time to take the reading. Add oil as necessary; never fill above the H mark, as the engine may then require more frequent decarbonisation.

OIL PRESSURE.

The oil pressure warning light on the instrument panel will glow when, for any reason, the pressure drops below 10 to 12 lb./sq.in. (0,7 to 0,8 kg./cm.²). It will light up when the engine is stationary and will go out when the engine has started and the oil pressure has built up to exceed this figure.

NOTE. The light may flicker when the engine is running at idling speed, but providing it fades out immediately the engine is speeded up, the oil pressure can be considered satisfactory.

Should the warning light appear at any time when the engine is running above idling speed, stop the engine immediately and investigate the cause; usually it will be due to low oil level in the sump, or occasionally, to a choked oil pump intake filter.

ENGINE OIL CHANGES.

When the vehicle leaves the factory, engine oil of a grade suitable for a temperate climate is in use.

Except under tropical or extreme winter conditions, the first engine oil change should be made at 750 miles (1.000 km.) or 30 hours; under such conditions the oil should be changed to the appropriate grade immediately upon receipt of the vehicle and then changed again at 750 miles (1.000 km.) or 30 hours.

Thereafter the oil must be changed at regular intervals (see Page E-16).

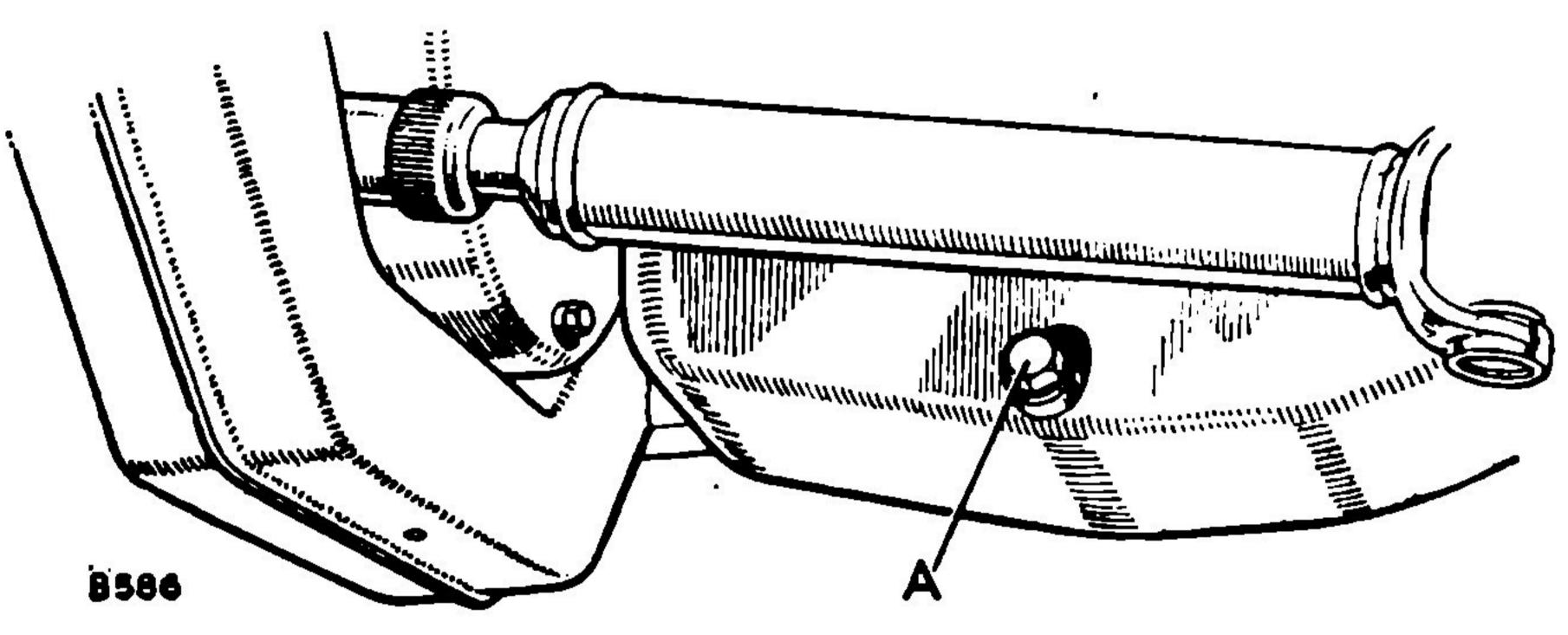


Fig. 9. Engine sump drain plug.

A—Drain plug.

To change the engine oil, proceed as follows:—

Run the engine to warm up the oil, switch off the ignition and remove the drain plug in the right-hand side of the sump. Allow time for the oil to drain away completely and replace the plug.

Refill with oil of the correct grade through the filler at the left-hand front of the engine; the capacity is 10 Imperial pints (5,5 litres).

OIL FILTERS.

In addition to the gauze pump intake filter in the sump, the oil is cleaned by means of a full-flow pressure filter mounted externally on the engine.

The gauze filter on the pump must be cleaned and the element of the full-flow filter renewed at regular intervals (see Page E-17). Both filters can conveniently receive this attention at a routine oil change.

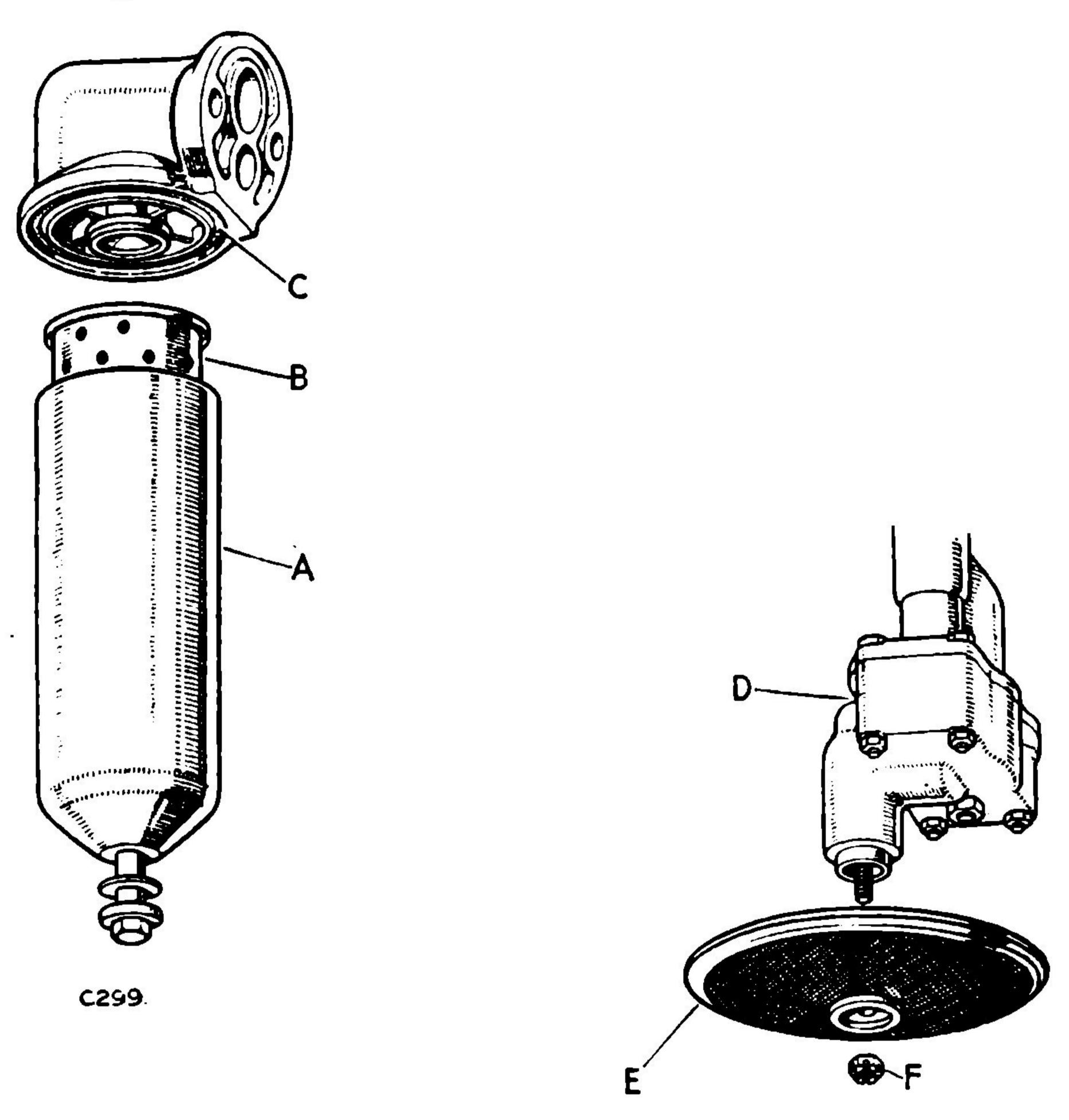


Fig. 10. Engine oil filters.

A—Container.

B—Element.

C—Gasket.

D—Oil pump.

E—Filter gauze.

To clean gauze filter remove the sump and dismantle filter from pump. Wash filter in petrol and clean with a stiff brush then refit to pump.

Clean sump with petrol and replace.

Unscrew the bolt in the bottom of the filter container and remove the container complete with the filter element. Remove and discard the used filter element and large rubber washer. Wash the container in petrol. Place the new filter element in the container and reassemble the unit using the new large rubber washer supplied with the element. Ensure that all the sealing washers are in position and intact and that the container is correctly located in the top cover.

Refill with correct grade of engine oil and run engine for five minutes, then check for leaks. Check oil level and replenish if necessary.

ENGINE BREATHER FILTERS.

The oil-wetted gauze filters fitted to the top rocker cover breather and oil filler pipe should be cleaned at regular intervals (see Page E-16) in the following manner:—

Remove the filters and wash the gauze thoroughly by swilling the units in a dish of petrol. Re-wet the gauzes by dipping in clean engine oil and shake off the surplus; replace the top filter with the slot facing forward and the bottom filter with the slot facing the rear of the vehicle.

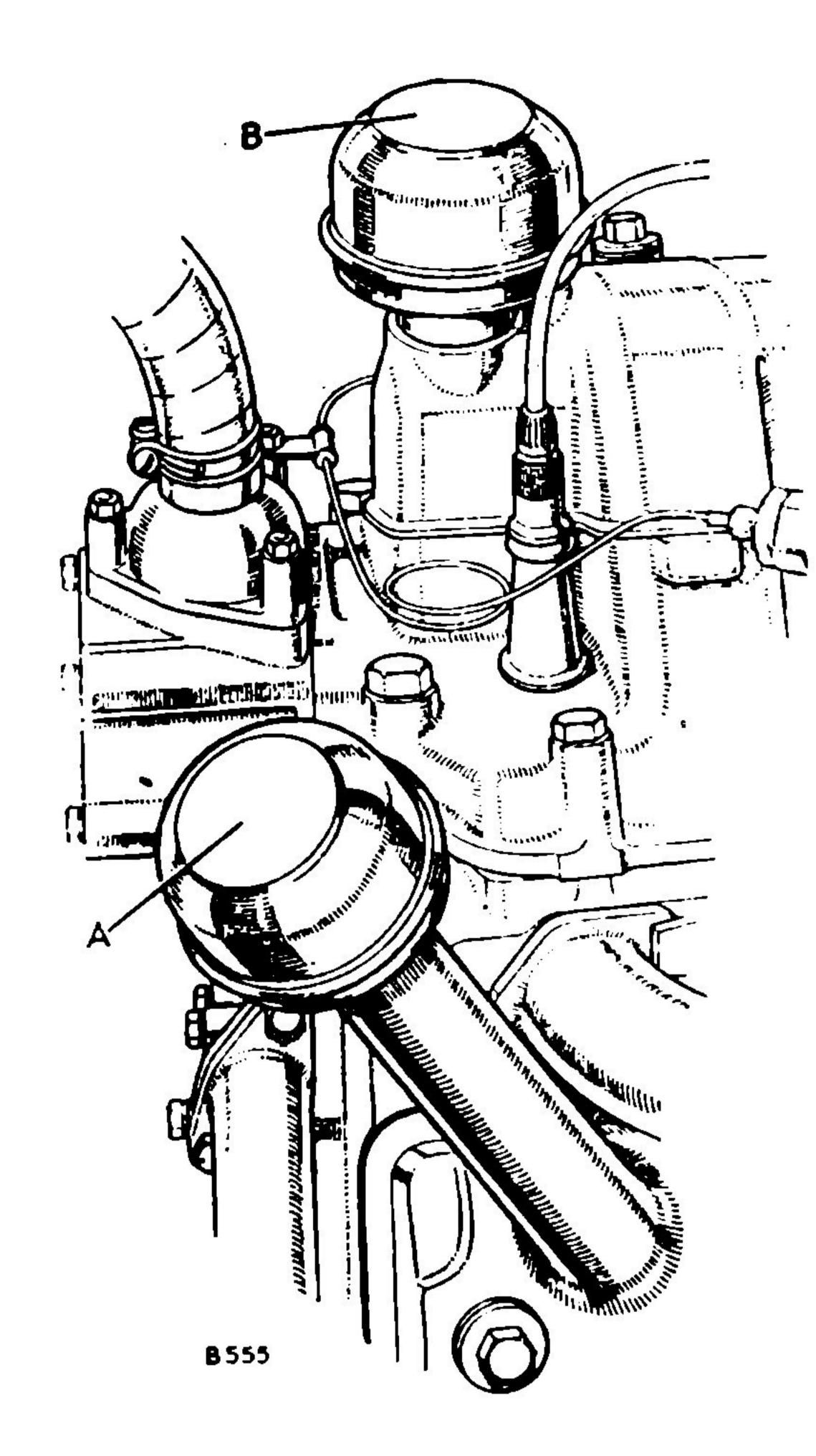


Fig. 11. Engine breather filters.

A—Oil filler filter.

B—Top rocker cover filter.

ENGINE TIMING.

FLYWHEEL MARKINGS.

Ignition and valve timing is based on markings on the engine flywheel which are visible, adjacent to a pointer, under the inspection cover on the right-hand side of the flywheel housing.

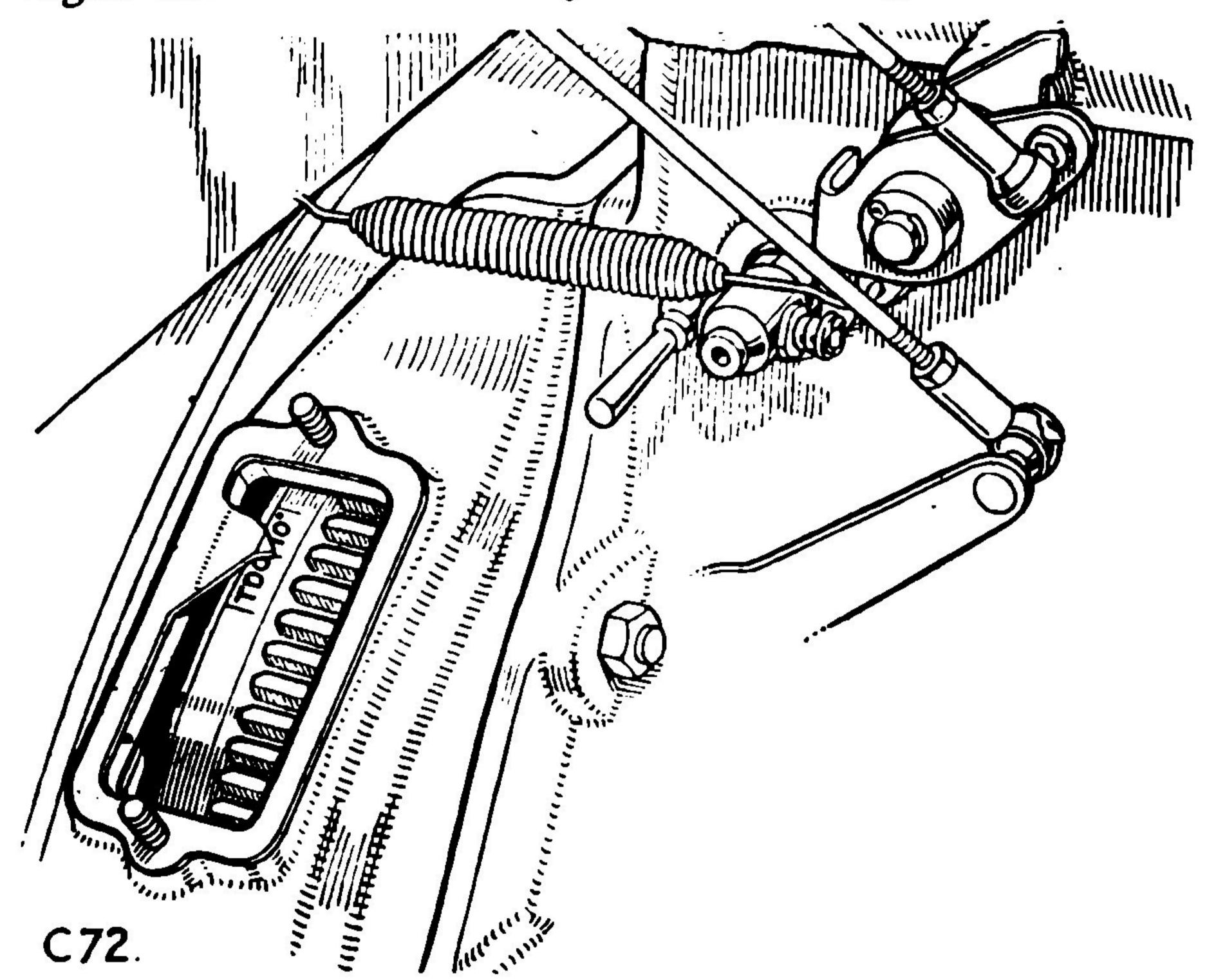


Fig. 12. Flywheel markings.

The markings and their meanings are as follows:-

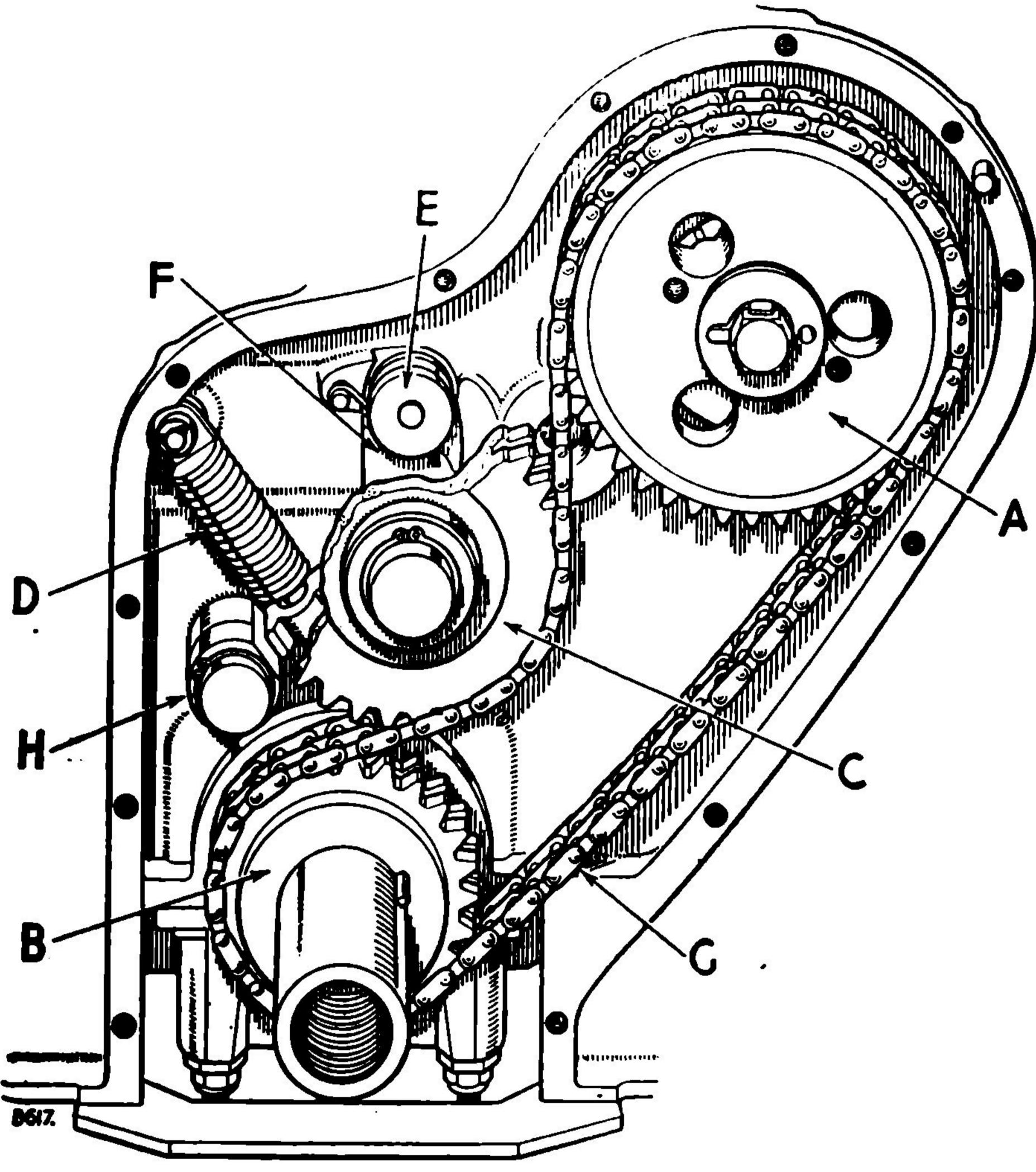
- 1. The line against which the letters T.D.C. are stamped, when brought opposite the pointer, indicates that No. 1 (front) piston is at top dead centre, i.e., at the top of its stroke.
- 2. The line against which the letters F.A. 10° are stamped, (2½ flywheel teeth before T.D.C.) when set opposite the pointer, indicates the firing-point of No. 1 cylinder, i.e., the position at which the distributor points should be just opening, with the rotor in the firing position for No. 1 or No. 4 cylinder.
- 3. The line against which the letters E.P. are stamped, when set opposite the pointer, indicates the point at which No. 1 exhaust valve should be at the peak of its lift (fully open). It is 114° before T.D.C. (31 flywheel teeth).

VALVE TIMING.

If the timing chain should have been removed, the procedure to re-time the engine is as follows.

- 1. Set No. 1 exhaust tappet to the correct clearance and slacken all the remaining adjusting screws as far as possible.
- 2. Rotate the camshaft in the running direction until No. 1 exhaust valve is fully open.

The use of a dial indicator is the only reliable method of determining this point. It should be mounted on a stud adjacent to No. 1 exhaust rocker and with its aid the possibility of an error in determining the exhaust peak is eliminated. It is possible to do the job correctly without a dial indicator, but much time is wasted and the possibilities of an error very much magnified.



Timing chain.

A—Camshaft chainwheel.

E--Pawl.

B—Crankshaft chainwheel.

F—Ratchet.

C-Jockey pulley.

G—Timing chain (driving side)

H—Jockey pulley arm. D-Hydraulic tensioner.

- 3. Rotate the engine in the running direction until the E.P. mark on the flywheel is in line with the pointer.
- 4. Fit the timing chain, ensuring that there is no slack on the driving side (G).
- Hold the ratchet pawl (E) clear and lift the jockey pulley arm (H) as far up as possible, ensuring that the ball end of the tensioner cylinder (D) is engaged in its seating. Replace the jockey pulley (C) on its shaft, meshing the pulley with the chain.
- 6. Check the timing and correct if necessary. The camshaft chainwheel (A) is made with three irregularly spaced keyways, so that if the timing will not come correct in the first position tried, alternatives are provided.
- 7. Fit the flat washer and circlip, retaining the jockey pulley on its arm. Engage the ratchet $(\mathbf{E}, \mathbf{F}).$
- Set the inlet tappets to the correct clearance.

IGNITION TIMING.

In addition to automatic timing advance mechanism, the distributor incorporates a hand setting control, known as the octane selector. This is a vernier adjustment attached to the distributor, fitted with a sliding portion controlled by an adjusting screw and a calibrated scale marked R (retard) and A (advance) with a number of divisions between. The standard setting for the ignition is with the long line of the scale on the sliding portion against the mark on the selector body, thus leaving one division further possible advance and four divisions retard. See Fig. 42, Page E-34.

This setting is correct for 80 octane fuel and with a clean engine, but should pinking develop as a result of the need for decarbonising, the control can be retarded a little by turning the screw in an anti-clockwise direction. Do not forget to return it to the original position after decarbonising.

In certain countries very low grade fuel is supplied, in which case it may be necessary to adjust the octane selector to avoid pinking, even with a clean engine.

Should the distributor have been disturbed, the ignition timing must be reset as follows:—

- 1. Set the contact breaker point gap to .014 to .016 in. (0,35 to 0,40 mm.) with the points fully open. Use the combined feeler gauge and screwdriver supplied in the tool kit.
- 2. Rotate the engine in the running direction until the F.A.10° mark on the flywheel is in line with the pointer, with both valves on No. 1 cylinder closed.
- 3. The distributor rotor will now correspond with No. 1 cylinder high tension lead terminal.
- 4. Set the octane selector so that the fourth line from the left-hand side of the calibrated slide is against the face of the distributor body casting.
- 5. Slacken the pinch bolt at the base of the distributor head; rotate the distributor bodily in the opposite direction to the arrow on the rotor arm until the contact breaker points are just opening with the fibre cam follower on the leading side of the cam; re-tighten the pinch bolt.

TAPPET ADJUSTMENT.

It is most important that tappet clearances be maintained at the correct figure and adjustment is therefore provided on each valve rocker. If anything less than the correct clearance is used, a fall in power output will follow, while greater clearance will mean noisy tappets.

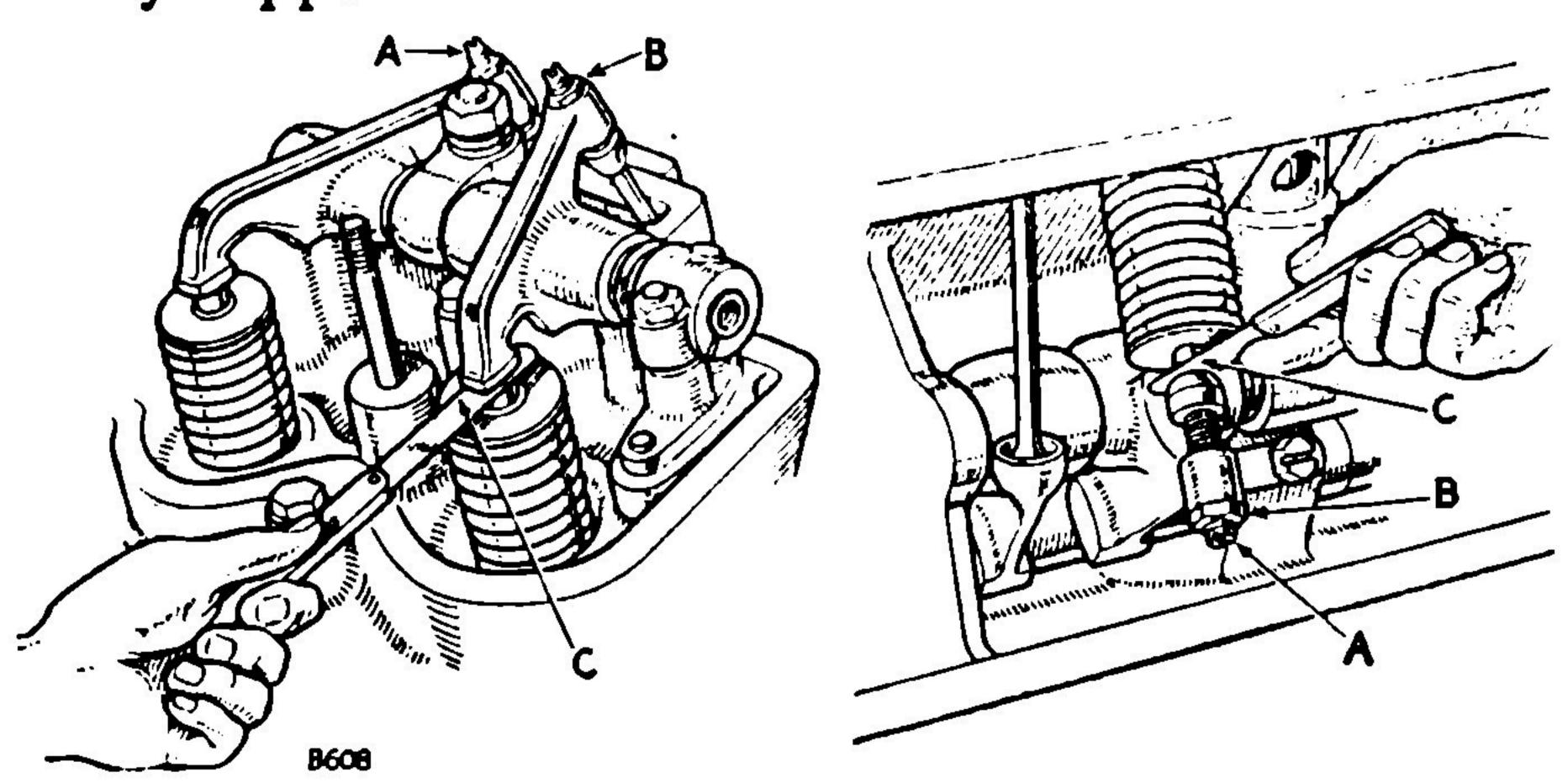


Fig. 14. Tappet adjustment.

A—Tappet adjusting screw.

C—Feeler gauge.

The correct clearance is .010 in. (0,25 mm.) on the inlet valves and .012 in. (0,30 mm.) on the exhaust valves, with the engine either cold or at running temperature. The cylinder firing order is 1, 3, 4, 2.

To carry out tappet adjustment, proceed as follows:—

- 1. Rotate the engine in the running direction until the valve receiving attention is fully open and then move the engine one complete turn, to bring the tappet on to the back of the cam.
- 2. Check the tappet clearance with a feeler gauge. If adjustment is required, slacken the locknut and rotate the tappet adjusting screw until the clearance is correct; re-tighten the locknut, taking care to ensure that this operation does not upset the clearance.
- 3. Repeat for the other valves in turn.

SPARKING PLUGS.

The sparking plugs are fitted with plastic covers retained in the cylinder head by rubber rings. To gain access to the plugs for cleaning and gap-setting, pull up the plug covers, without detaching them from the high tension leads.

At regular intervals (see Page E-16) remove the plugs, clean and re-set the electrode gaps to .029 to .032 in. (0.75 to 0,80 mm.) if necessary.

CLUTCH

The clutch must only be used when starting the vehicle from rest or when changing gear; at all other times, the foot should be kept clear of the clutch pedal, to avoid unnecessary lining wear.

CLUTCH ADJUSTMENT.

To ensure efficient operation of the clutch unit, there must be free movement in the linkage, to the extent of $\frac{3}{4}$ in. (20 mm.) measured at the pedal pad.

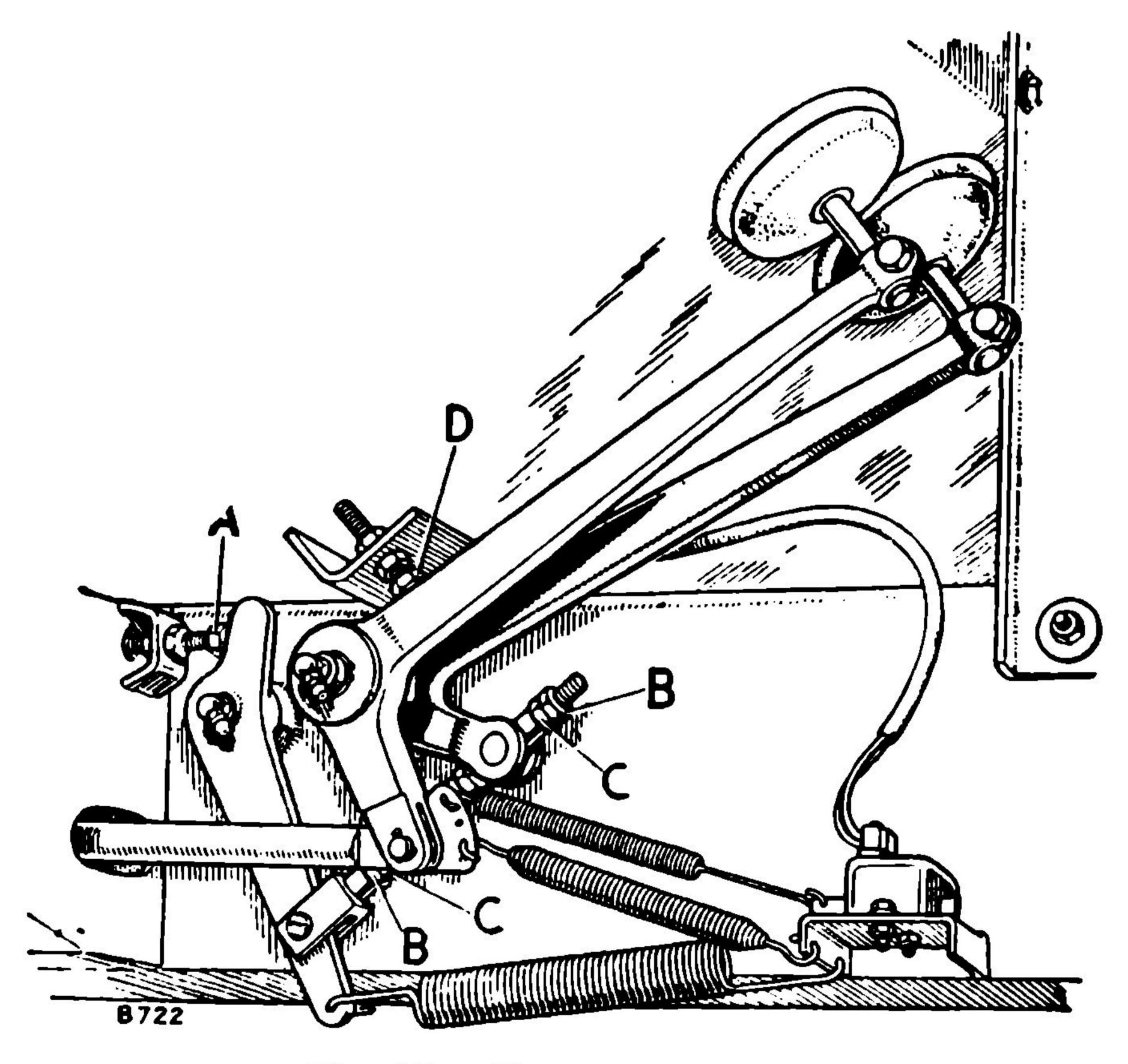


Fig. 15. Clutch adjustment.

A—Stop bolt. B—Locknuts. C—Adjusting nuts.

This point must be checked from time to time. It there is more than the required free movement, slacken the locknut and screw out the stop bolt (A) until the movement is correct; secure with the locknut. This action will alter the position of the pedal pad, which can be re-set by means of the adjustment provided on the clutch linkage. Slacken the outer locknuts (B) and rotate the inner adjusting nuts (C), both in the same direction, until the pedal is set in a convenient position. Tighten the adjusting nuts and distance pieces against the ioint pin and secure with the locknuts.

MAIN GEARBOX

MAIN GEARBOX LUBRICATION.

The main gearbox and clutch withdrawal mechanism are lubricated as one unit.

OIL LEVEL.

The main gearbox oil level must be checked periodically (see Page E-16) and replenished as necessary to the H mark on the dipstick. Both the dipstick and filler plug are accessible through the swinging cover plate on the gearbox cover.

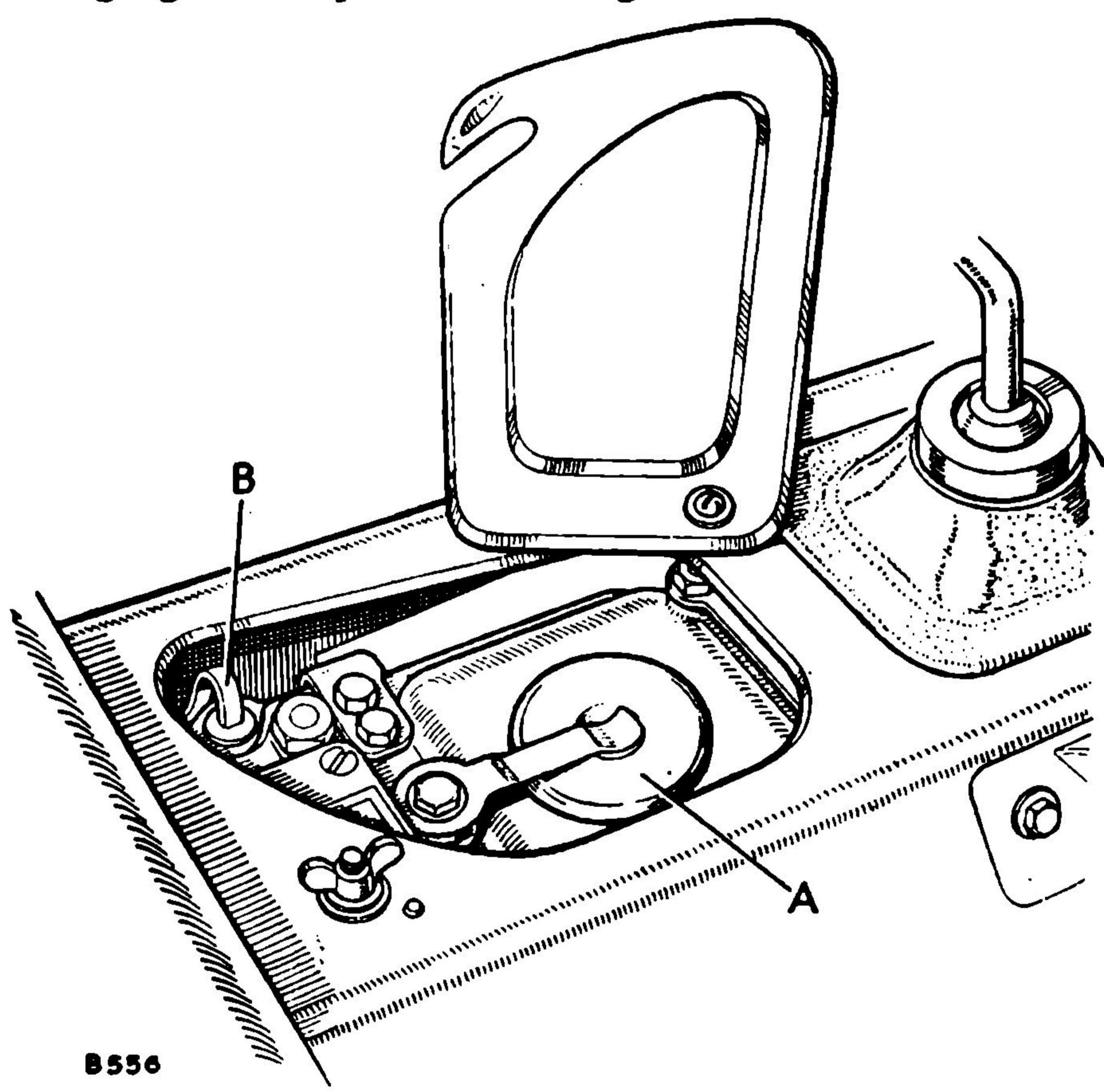


Fig. 16. Gearbox oil filler.

A-Filler cap.

B-Dipstick.

BELL HOUSING DRAIN PLUG.

The gearbox bell housing is completely sealed to exclude dust and mud under severe wading conditions. Because of this, a drain plug is provided in the bottom of the housing, so that any oil accumulating from the rear main bearing or gearbox can be drained away before it affects the clutch.

This plug must be removed periodically (see Page E-16) and all oil allowed to drain off before the plug is replaced.

NOTE. If the vehicle is not expected to do wading or very muddy work, the plug can be left out at the operator's discretion, provided the plug is replaced if it later becomes necessary to undertake wading work.

GEARBOX OIL CHANGES.

Except under extreme winter conditions, the first gearbox oil change should be made at 750 miles (1.000 km.) or 30 hours; under such conditions the oil should be changed to the appropriate grade immediately upon receipt of the vehicle and then changed again at 750 miles (1.000 km.) or 30 hours.

Thereafter the oil must be changed periodically (see Page E-17).

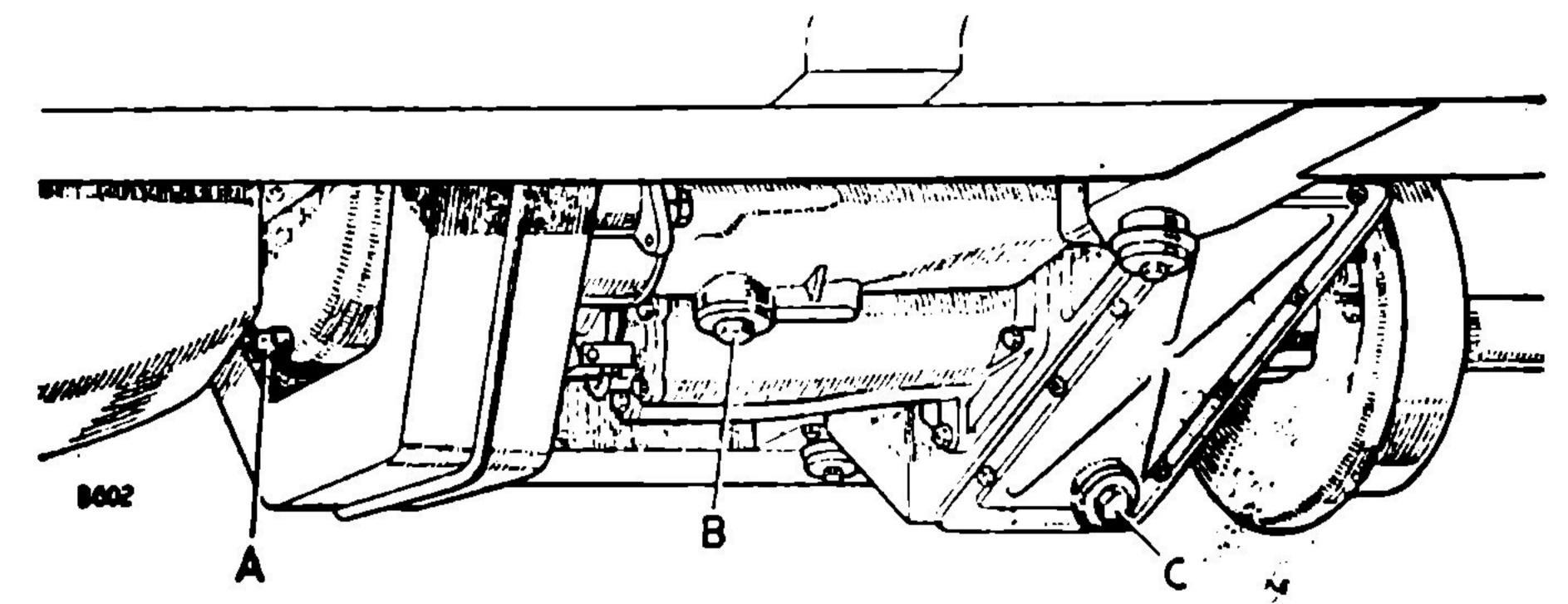


Fig. 17. Gearbox drain plugs.

A-Bell housing plug.

B—Gearbox plug.

C—Transfer box plug.

To change the oil, remove the drain plug from the bottom of the main gearbox casing, immediately after a run when the oil is warm; allow the oil to drain away completely and replace the plug. Refill with oil of the correct grade; the capacity is approximately 2½ Imperial pints (1,5 litres). The drain plug has a slotted head and can be removed with the aid of the handle of the single-ended spanner in the tool kit.

TRANSFER BOX

TRANSFER BOX LUBRICATION.

The transfer box and front wheel drive housing are lubricated as one unit.

OIL LEVEL.

The transfer box oil level must be checked periodically (see Page E-16) and replenished as necessary to the bottom of the level plug hole. The level plug is in the rear face of the transfer box and the filler plug on the cover plate on top of the box on the right-hand side; both are accessible when the seat box centre panel is removed.

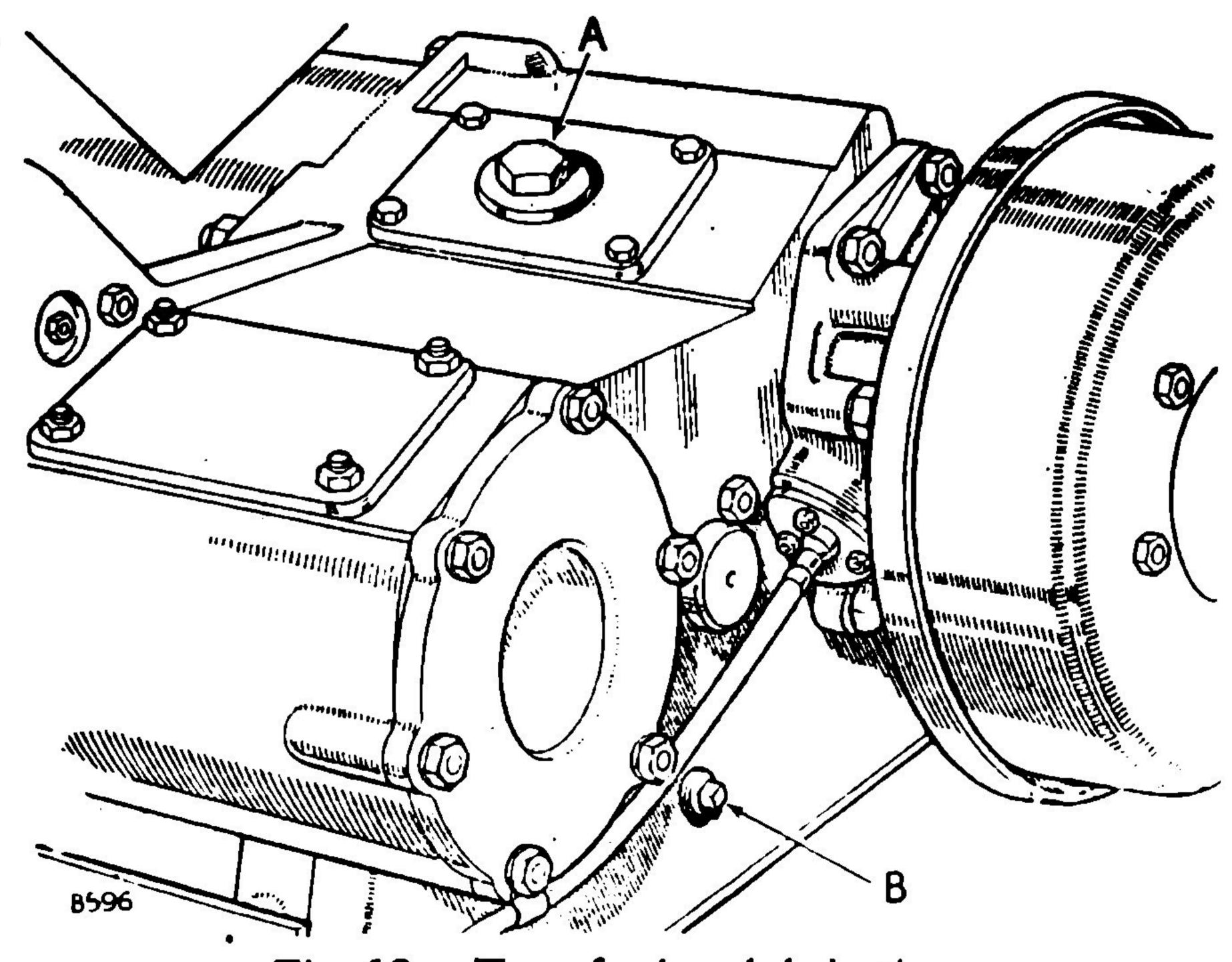


Fig. 18. Transfer box lubrication.

A—Filler plug. B—Level plug.

TRANSFER BOX OIL CHANGES.

Except under extreme winter conditions, the first transfer box oil change should be made at 750 miles (1.000 km.) or 30 hours; under such conditions the oil should be changed to the appropriate grade immediately upon receipt of the vehicle and then changed again at 750 miles (1.000 km.) or 30 hours.

Thereafter the oil must be changed periodically (see Page E-17).

To change the oil, remove the drain plug (see Fig. 17) from the bottom of the transfer box immediately after a run when the oil is warm; allow the oil to drain away completely and replace the plug. Refill with oil of the correct grade; the capacity is 4½ Imperial pints (2,5 litres).

PROPELLER SHAFTS

PROPELLER SHAFT LUBRICATION.

At regular intervals (see Page E-16), apply one of the recommended oils, using the oil gun provided in the tool kit, at the lubrication nipple on the sliding portion of the front and rear propeller shafts.

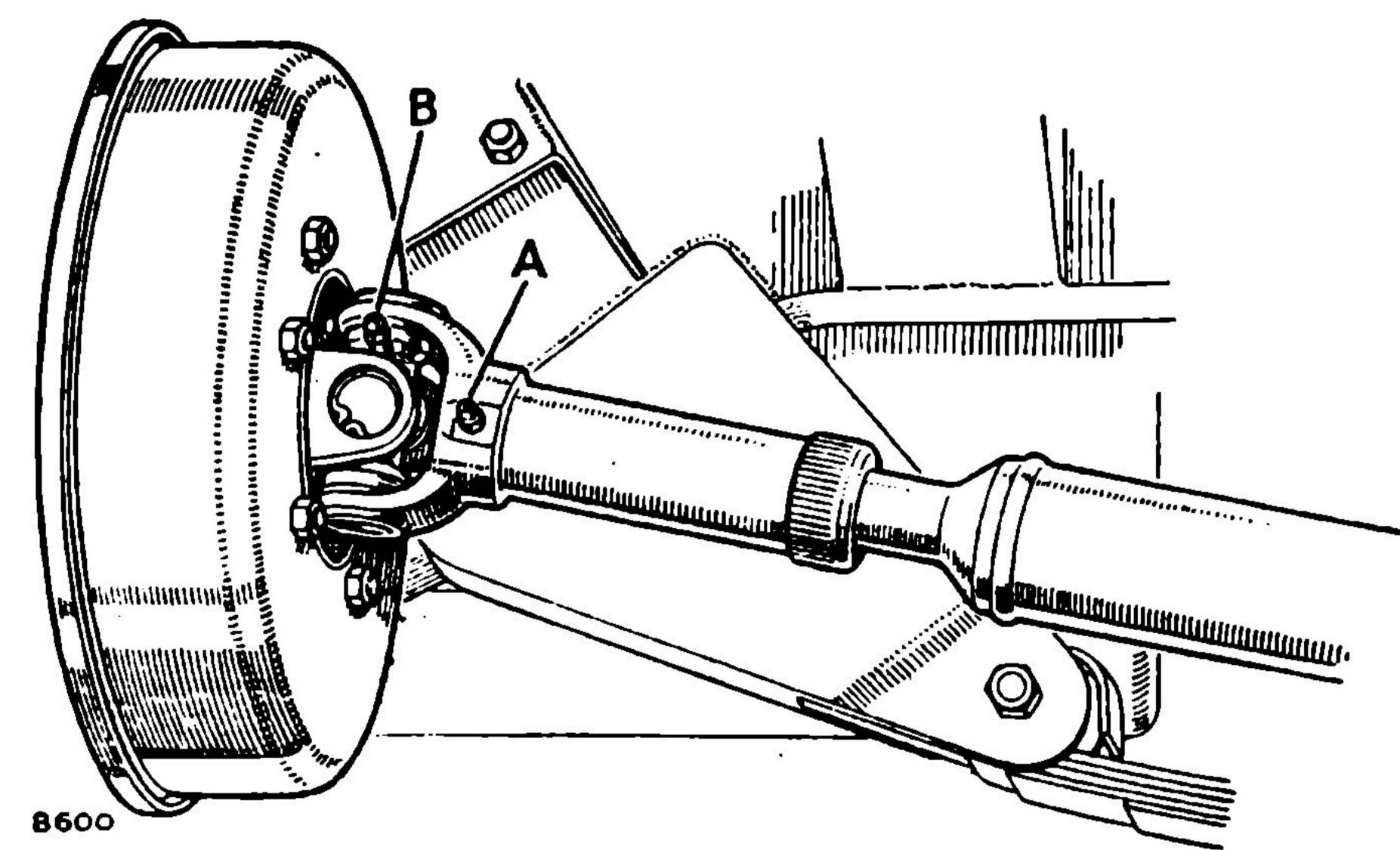


Fig. 19. Propeller shaft lubrication.

A—Sliding sleeve nipple. B—Universal joint nipple.

At the same time, apply the correct grade of oil at the lubrication nipples fitted to the four universal joints. It is preferable to use the oil gun provided, but if high pressure equipment is used, care must be taken not to damage the seals in the joints.

PROPELLER SHAFT BOLTS.

Periodically check the security of the propeller shaft securing bolts and rectify as necessary (see Page E-17).

FRONT AND REAR DIFFERENTIALS

FRONT AND REAR DIFFERENTIAL LUBRICATION.

OIL LEVEL.

The differential oil levels must be checked periodically (see Page E-16), immediately after a run when the oil is warm, and replenished as necessary to the bottom of the filler plug hole. The rear axle level/filler plug is on the right-hand side of the differential casing and the front axle plug is at the front of the axle casing.

NOTE. A second plug fitted at the rear of the front axle casing can be disregarded.

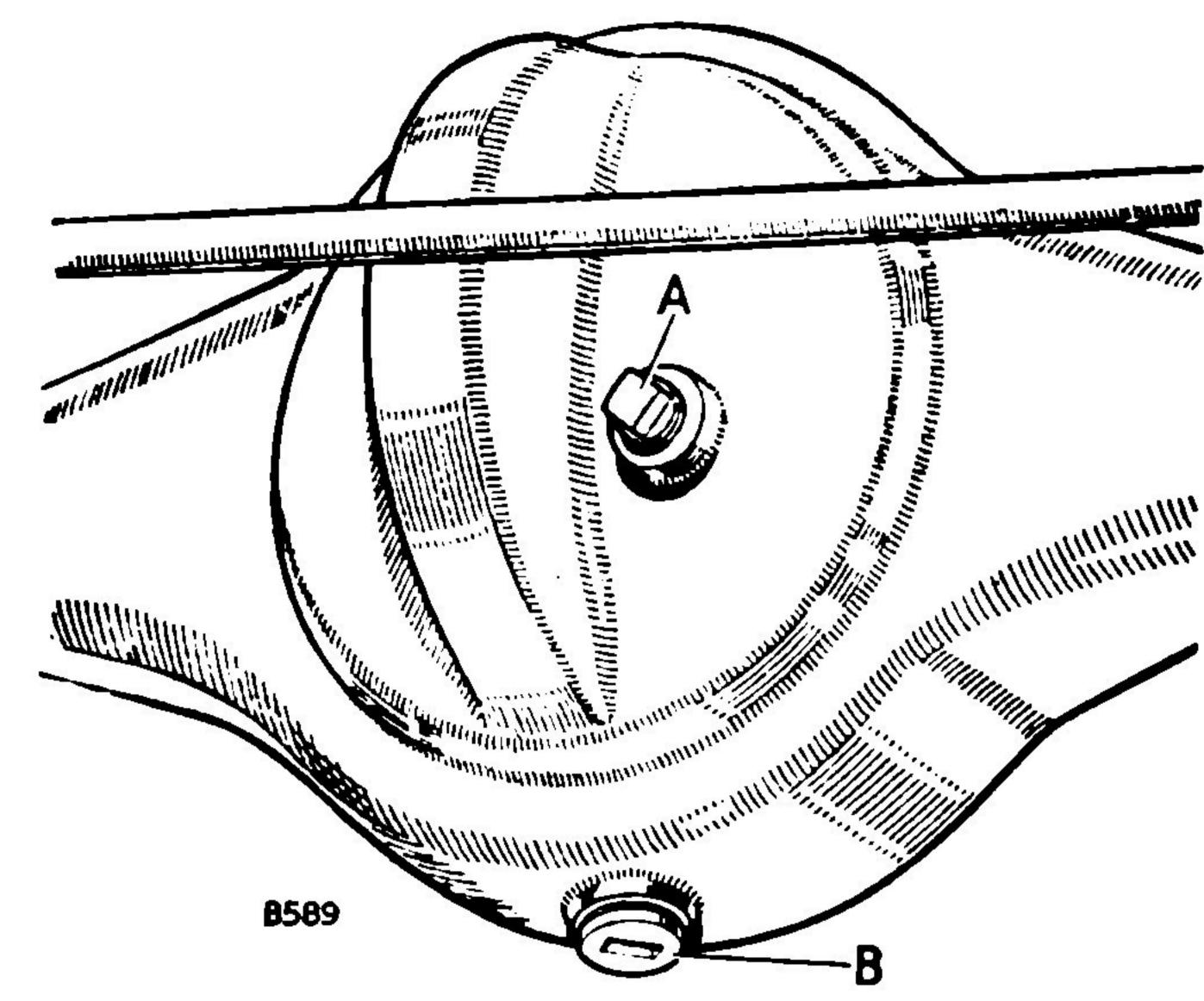


Fig. 20. Front differential lubrication.

A—Filler/level plug. B—Drain plug.

DIFFERENTIAL OIL CHANGES.

Except under extreme winter conditions, the first differential oil change should be made at 750 miles (1.000 km.) or 30 hours; under such conditions, the oil should be changed to the appropriate grade immediately upon receipt of the vehicle and then changed again at 750 miles (1.000 km.) or 30 hours.

Thereafter the oil must be changed periodically (see Page E-17) in the following manner:—

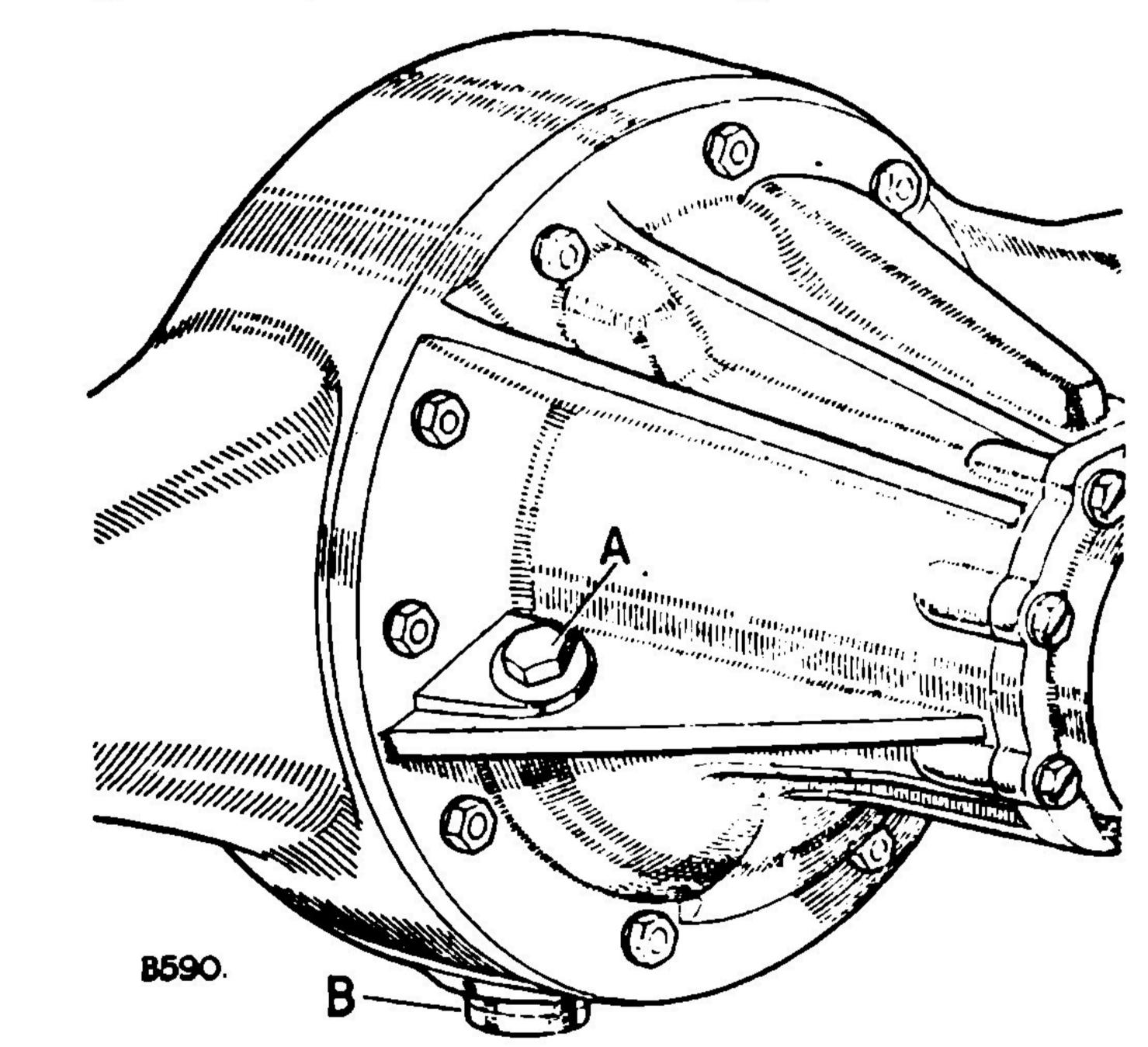


Fig. 21. Rear differential lubrication.

A—Filler/level plug. B—Drain plug.

Immediately after a run, when the oil is warm, drain off the oil by removing the drain plugs in the bottom of the axle casings. Replace the drain plugs and refill with oil of the correct grade; the capacity of each differential is approximately 3 Imperial pints (1,75 litres).

The drain plugs have slotted heads and can be removed with the aid of the handle of the single-ended spanner in the tool kit.

SWIVEL PIN HOUSINGS

SWIVEL PIN HOUSING LUBRICATION.

The front wheel drive universal joints, swivel pins and front hubs receive their lubrication from the swivel pin housings.

OIL LEVEL.

The swivel pin housing oil levels must be checked periodically (see Page E-16) and replenished as necessary to the bottom of the filler/level plug holes at the rear of the housings.

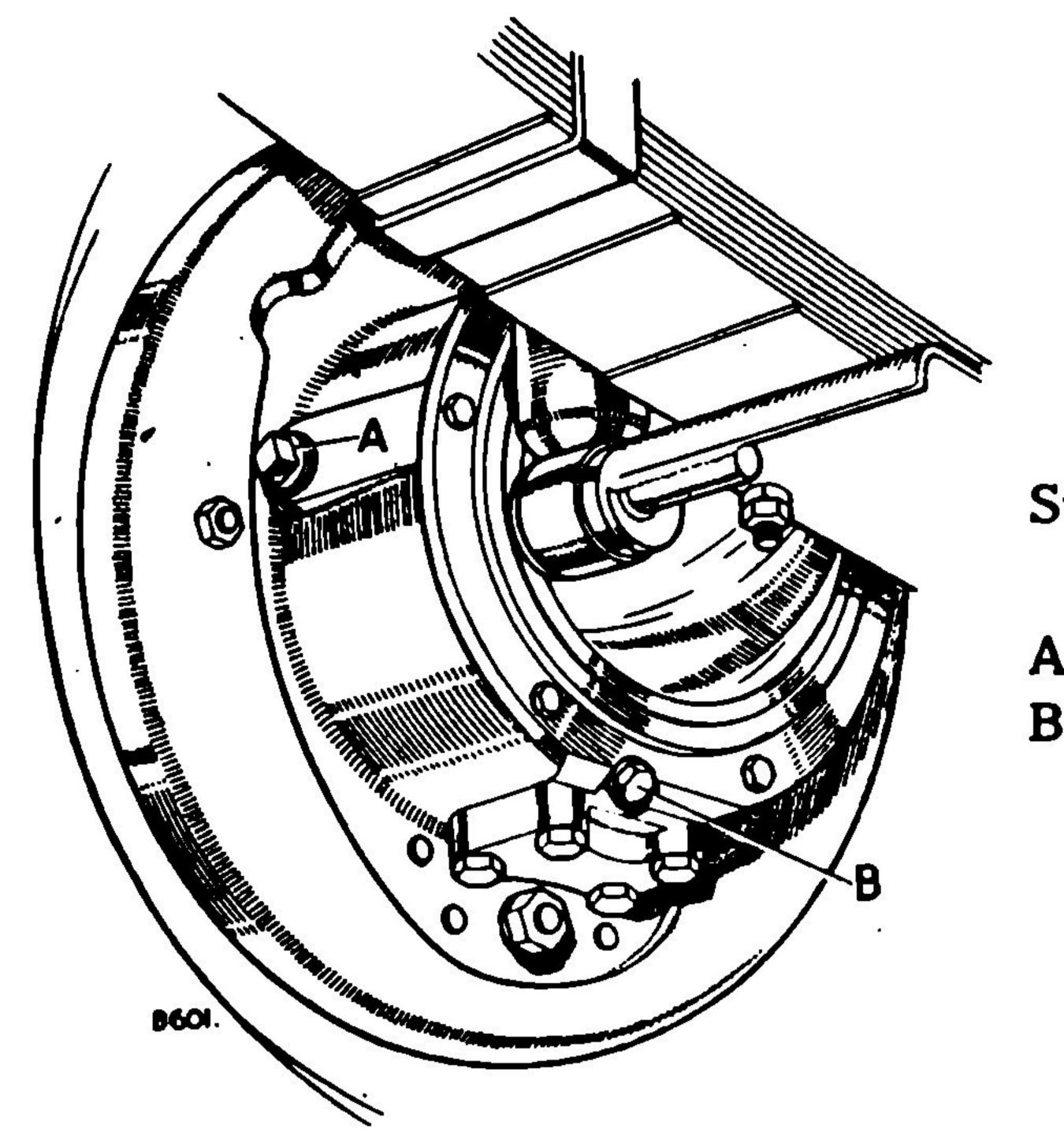


Fig. 22.

Swivel pin housing lubrication.

A—Filler/level plug.
B—Drain plug.

SWIVEL PIN HOUSING OIL CHANGES. .

Except under extreme winter conditions, the first oil change should be made at 750 miles (1.000 km.) or 30 hours; under such conditions, the oil should be changed to the appropriate grade immediately upon receipt of the vehicle and then changed again at 750 miles (1.000 km.) or 30 hours.

Thereafter the oil must be changed periodically (see Page E-17).

To change the oil, remove the drain plug from the bottom of each housing, immediately after a run when the oil is warm; allow the oil to drain away completely and replace the plugs. Refill with oil of the correct grade through the filler/level plug holes; the capacity of each housing is approximately 1 Imperial pint (0,5 litre).

STERING

WORM AND NUT TYPE (86 and 107) STEERING BOX LUBRICATION

The steering box oil level must be checked periodically (see Page E-16) and replenished as follows:—

Remove the filler plug on top of the column and the air release plug on the steering box. If oil runs from the release plug hole, replace it; if not, pour oil through the filler until it runs from the release plug hole and replace the release plug. Then pour as much oil as possible through the filler before replacing the plug.

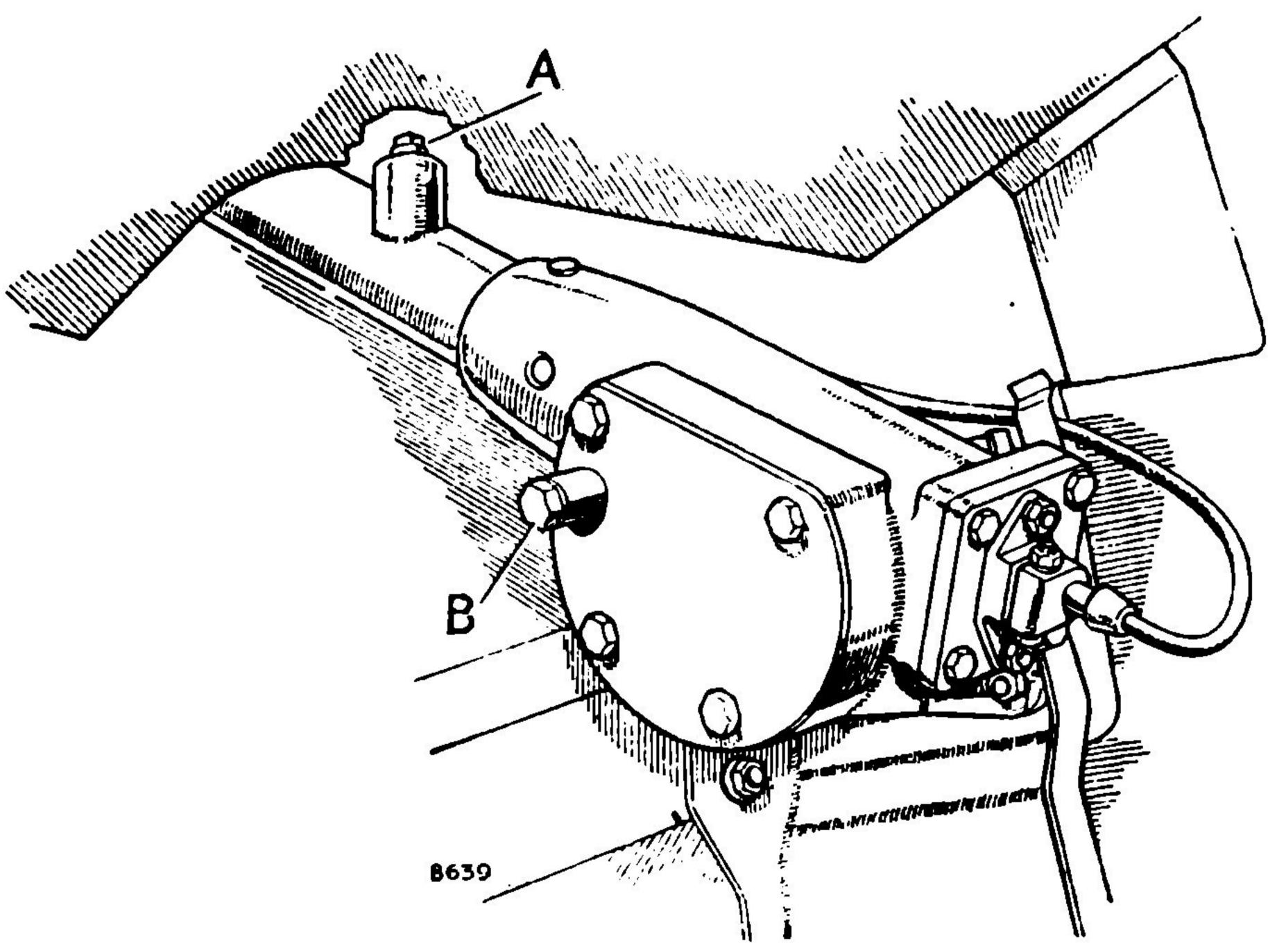


Fig. 23. Steering box lubrication.

A—Oil filler plug. B—Air release plug.

Access to the filler plug is gained by lifting the bonnet panel and to the release plug from beneath the front wing.

STEERING COLUMN ADJUSTMENT.

End thrust in the steering column is taken on an adjustable bearing at the top of the column. Wear or end-play in the steering unit can therefore be taken up when necessary in the following manner:—

1. Remove the steering wheel, dust shield and spring.

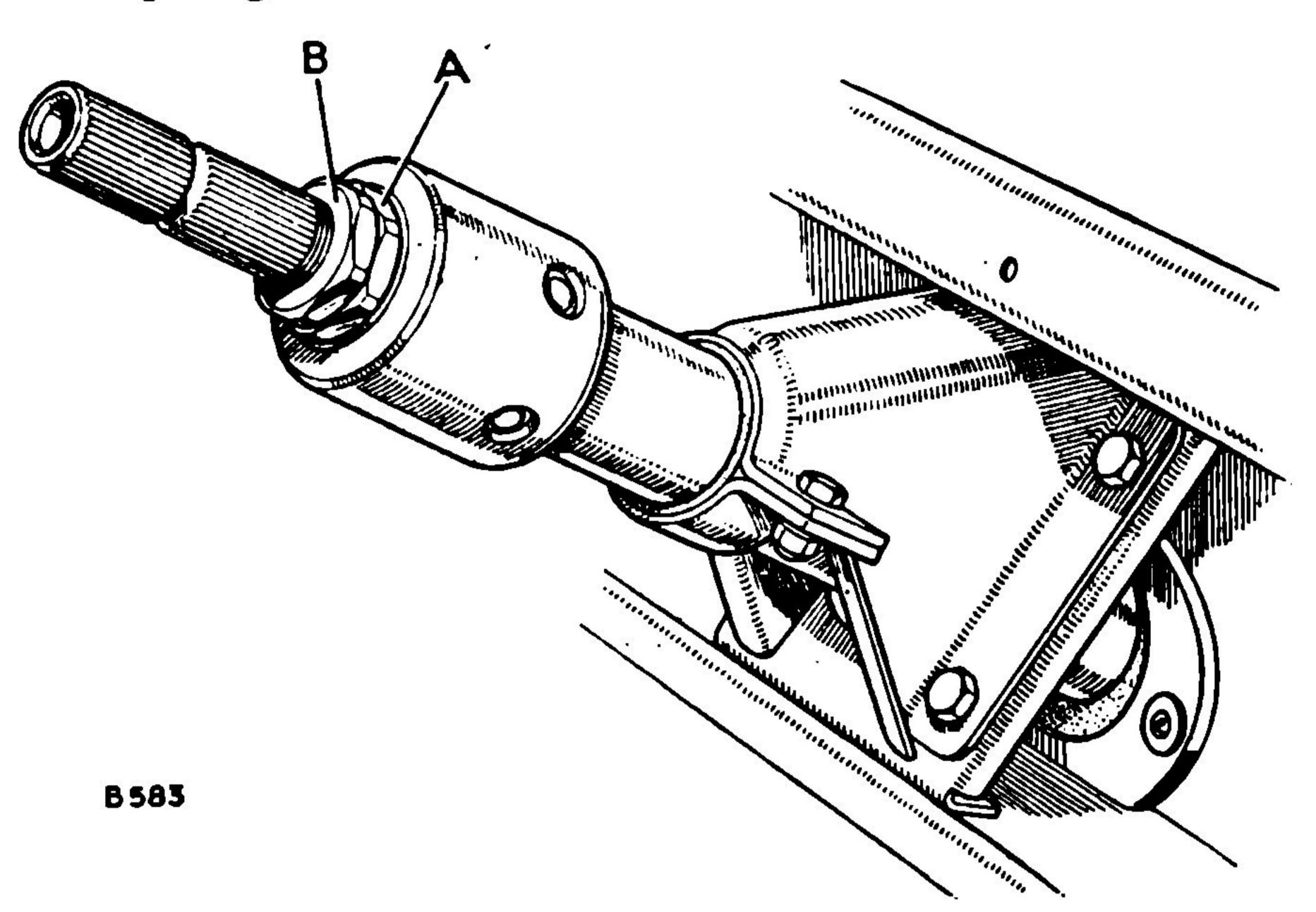


Fig. 24. Steering column adjustment.

A—Adjusting nut.

B—Locknut.

- 2. Slacken the bearing locknut now exposed (upper nut) and tighten the lower nut until the end-play in the column just disappears. This condition is most readily determined if the steering wheel is replaced temporarily, when any play in the column can be detected if the wheel is gently pulled up and down.
- 3. When the setting is correct, re-tighten the locknut securely and replace the spring, dust shield and steering wheel.

RECIRCULATING BALL TYPE (88 and 109) STEERING BOX LUBRICATION.

The steering box oil level must be checked periodically (see Page E-16) and replenished as necessary to the bottom of the filler plug hole on the top of the cover plate. Access to the plug is gained by lifting the bonnet panel.

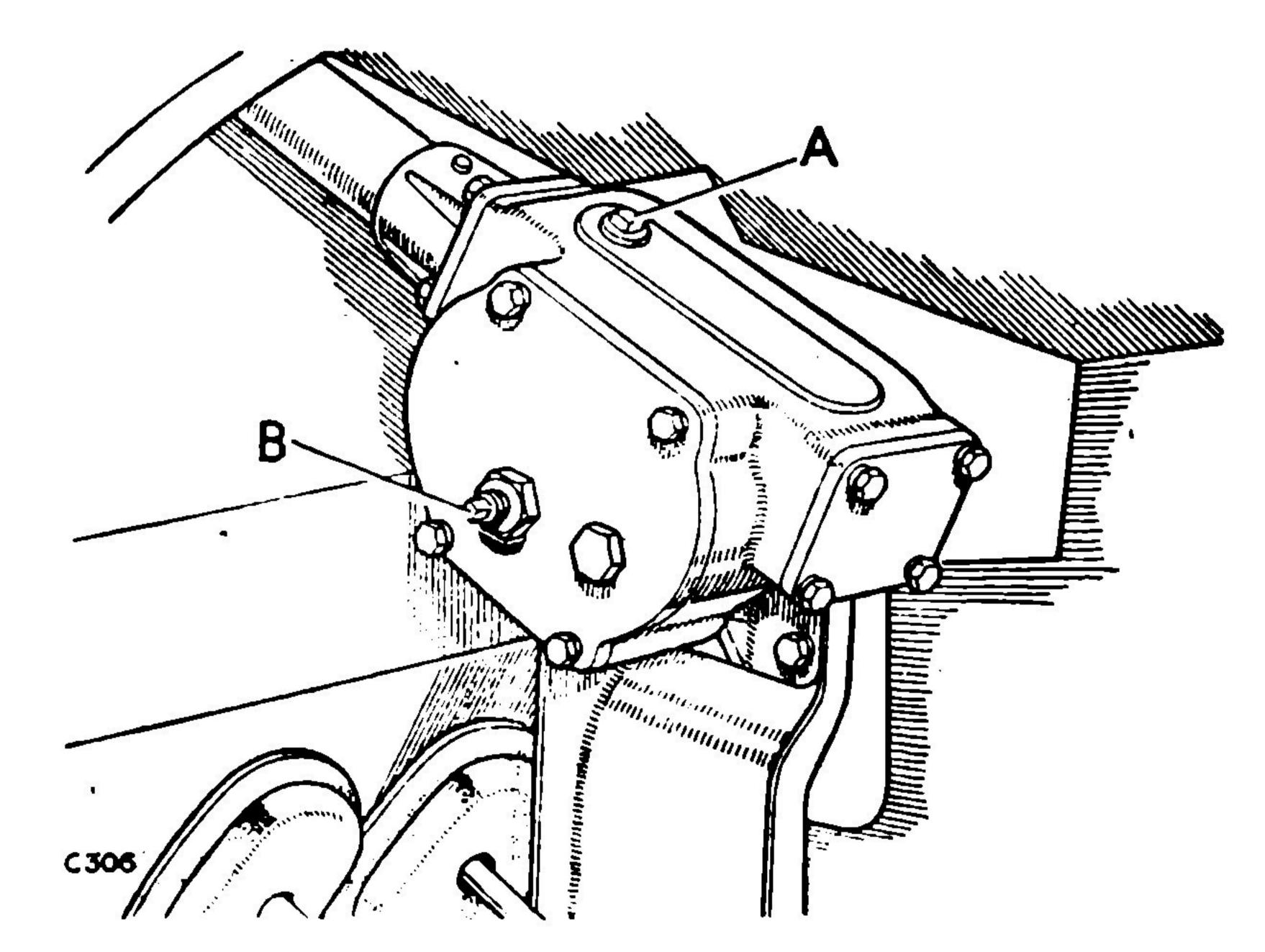


Fig. 25. Recirculating steering box lubrication.

A—Filler plug. B—Adjuster screw.

ROCKER SHAFT ADJUSTMENT.

End play in the rocker shaft may be taken up by means of the adjuster (see Fig. 25) in the side cover plate. Need for attention at this point will be indicated by a slight rattle from the steering column.

The adjustment should be carried out after the first 750 miles (1.000 km.), but thereafter will only be required at long intervals.

Proceed as follows:—

With the road wheels set straight ahead, slacken the locknut and screw the adjuster down by hand until it contacts the top of the rocker shaft; tighten a further one-tenth of a turn and secure with the locknut.

STEERING COLUMN ADJUSTMENT.

End thrust in the steering column is taken up by removing shims and joint washers under the bottom cover of the steering box.

- 1. This adjustment will be made more accessible by the removal of the off-side front wheel.
- 2. Remove bottom cover of steering box which is retained by four bolts.
- 3. Withdraw bottom cover and remove all shims and joint washers.
- 4. Replace bottom cover only and tighten up until no end-float is experienced on rotating the steering wheel.

Measure with a feeler gauge the gap between the bottom cover and the body of the box that has been caused by the removal of shims and joint washers.

- 5. Remove bottom plate and insert required number of shims and alternate joint washers as ascertained above, checking on assembly that no end thrust is apparent.
- 6. Lower vehicle and top-up steering box with correct grade of oil.

STEERING BALL JOINTS.

Steering joints on the Land-Rover have been designed in such a way as to retain the initial filling of grease for the normal life of the ball joints, however this applies only if the rubber boot remains in position on the ball joint. The rubber boots should be checked periodically (see Page E-16) to ensure that they have not become dislodged or the joint be damaged. Should any of the rubber boots be pushed out of position proceed as follows:—

- (a) Remove ball end from lever.
- (b) Remove rubber boot.
- (c) Thoroughly clean all parts.
- (d) Apply grease (Castrolease Heavy, Energrease C3 or Mobilgrease No. 4) round taper of ball joint and also fill the boot.
- (e) Re-assemble all parts using new rubber boot and springs as required.

SUSPENSION

HYDRAULIC DAMPERS.

The telescopic hydraulic dampers on both front and rear springs require no maintenance attention; should they be damaged, replacement units must be fitted.

FRONT WHEEL ALIGNMENT.

As an aid to maximum tyre life and comfortable steering, the front wheel alignment should be checked by a Rover dealer at regular intervals.

ROAD SPRINGS.

At regular intervals (see Page E-17), check the security of the road spring leaf clips and the nuts on the U bolts securing the axles to the springs; rectify as necessary.

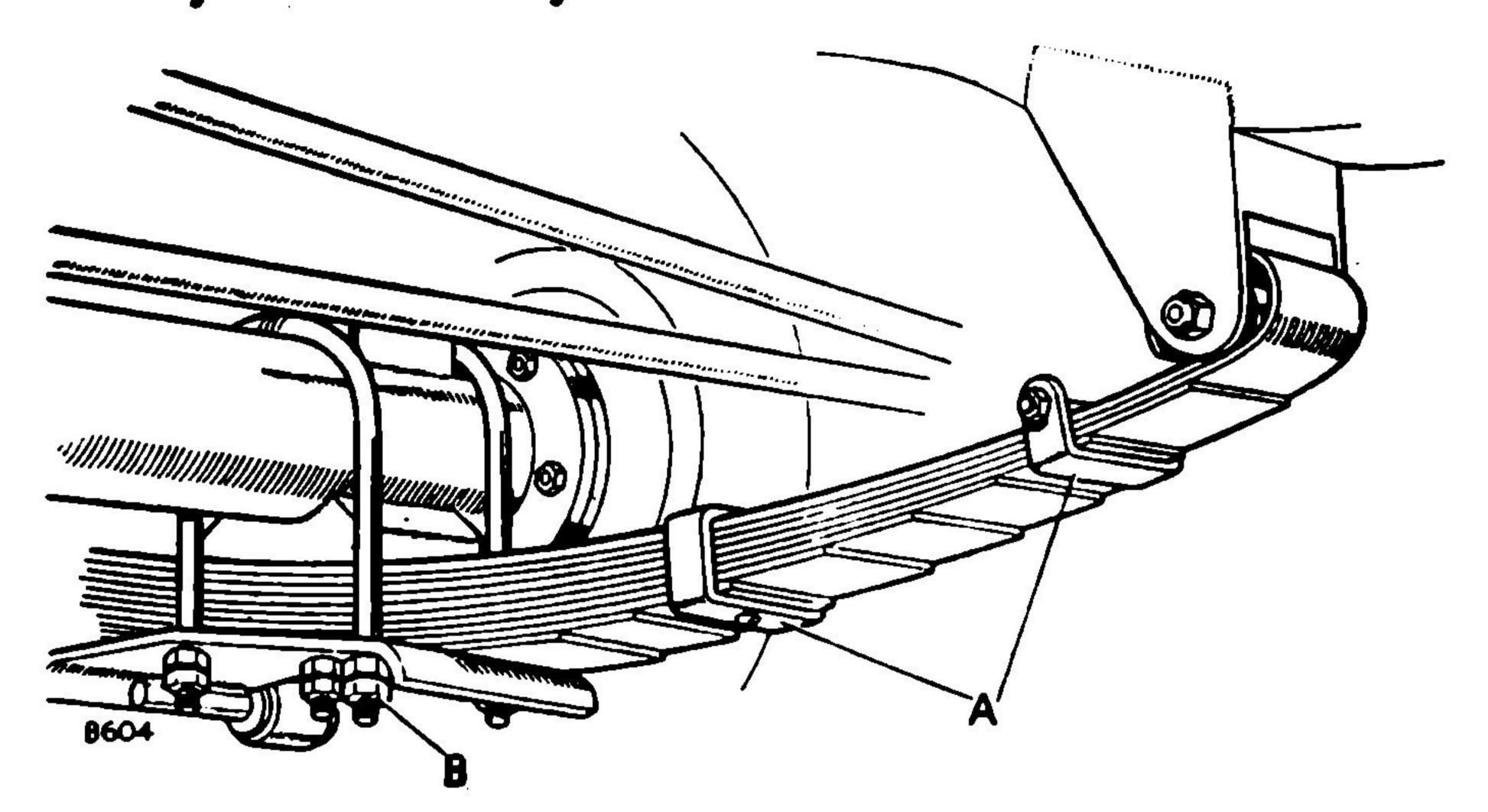


Fig. 26. Leaf clips and U bolts.

A—Leaf clips.

B—U bolt nuts.

CHASSIS

FOOT-PEDAL LUBRICATION.

Periodically (see Page E-16), apply one of the recommended oils at the lubrication nipples on the pedal shafts.

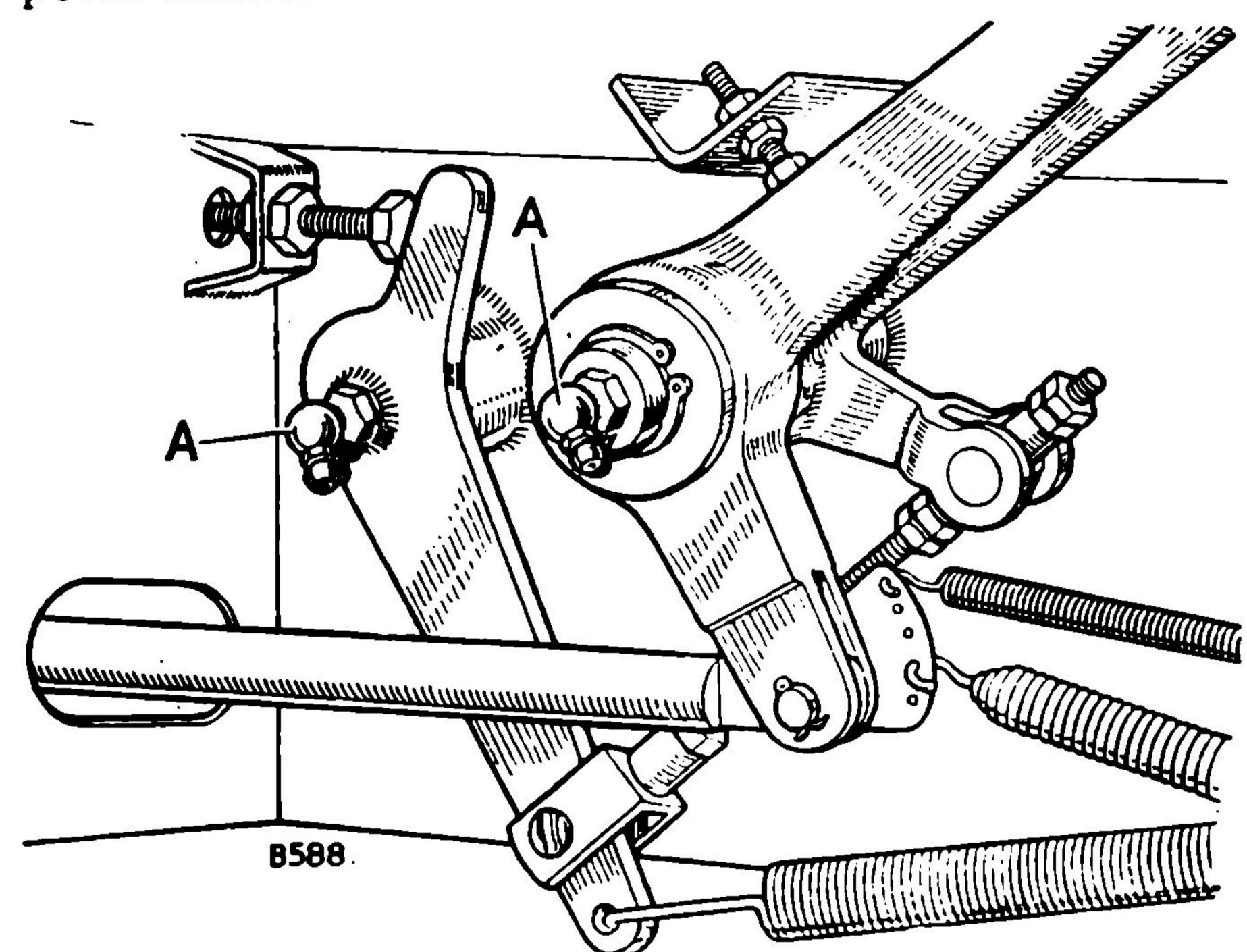


Fig. 27. Pedal shaft lubrication.

A—Lubrication nipples.

BRAKE SYSTEM

The wheel brakes, operated by the foot pedal, are of the hydraulic type, while the hand-brake operates a mechanical brake unit mounted on the output shaft from the transfer box.

BRAKE FLUID RESERVOIR.

The fluid reservoir for the hydraulic brake system is fitted under the seat box on the right-hand side and is accessible when the locker lid is raised. See Fig. 7, Page E-12.

The correct fluid level is with the reservoir threequarters full; periodically, remove the filler cap and replenish as necessary, using only Girling Crimson Brake Fluid (obtainable from any Rover dealer). It is advisable to check this point regularly, as shortage of fluid will result in gradual deterioration of the brakes which may not be noticed by the driver.

WHEEL BRAKE ADJUSTMENT.

When lining wear has reached the point where the pedal travel becomes excessive, it is necessary to adjust the brake shoes in closer relation to the drum.

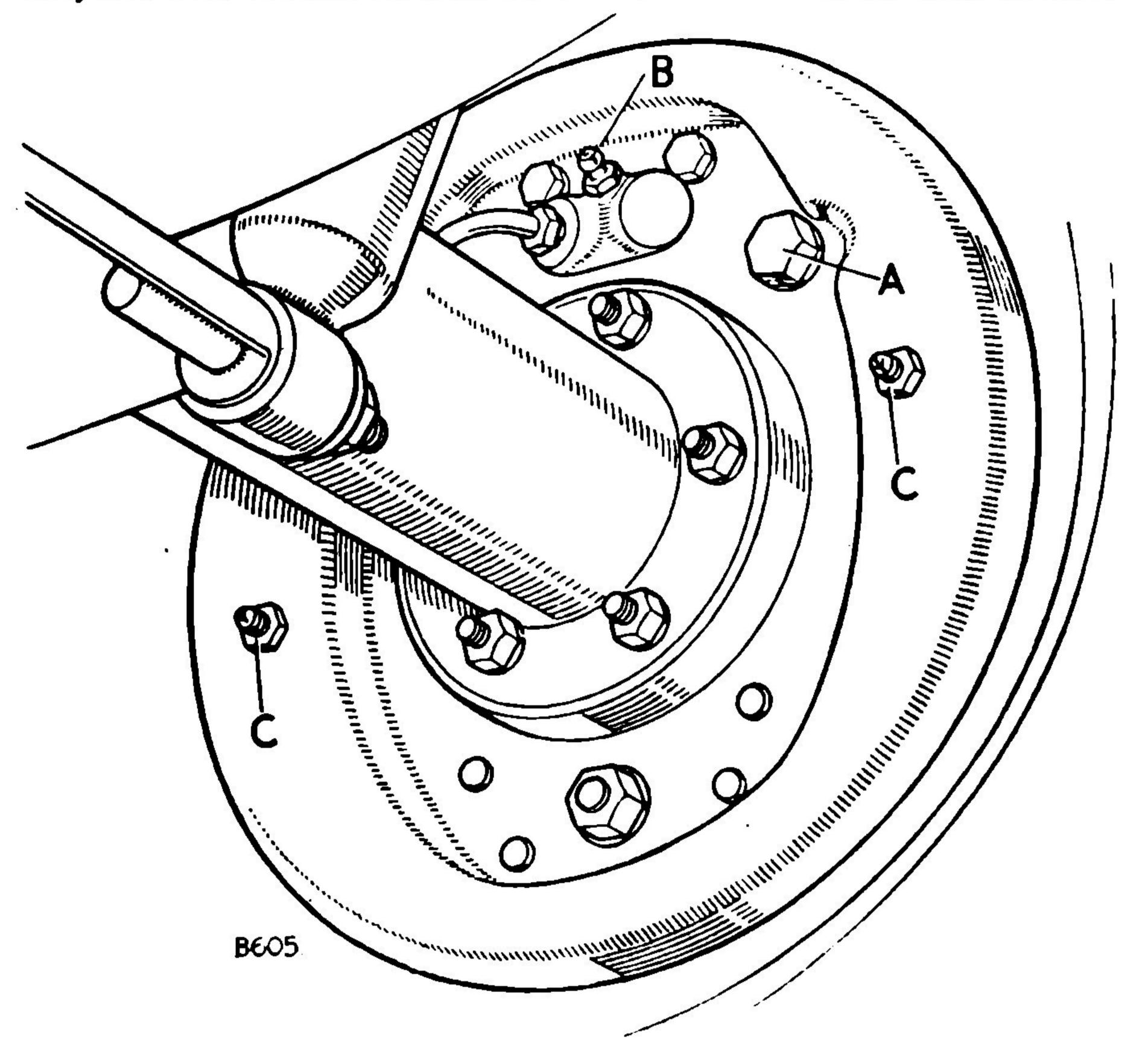


Fig. 28. Wheel brake adjustment.

A—Adjustment bolt. B—Bleed nipple.

C—Shoe steady posts.

Proceed as follows:—

All 86, 88 and 107 models with 10" brakes.

Jack up each wheel in turn. On the back face of the brake anchor plate, will be found a hexagon adjustment bolt (A), which operates a snail cam bearing on the leading shoe. Only one of these is fitted to each wheel brake unit, thereby providing singlepoint adjustment. Spin the wheel and rotate the adjuster bolt until the brake shoe contacts the drum, then ease the adjuster until the wheel again rotates freely. Repeat for the other three wheels.

107 and 109 with 11" brakes.

Front

Each shoe is independently set by means of an adjuster operating through a serrated snail cam.

- 1. With the vehicle jacked up, ensure that the wheels rotate freely; slacken off the adjusters if necessary by turning anti-clockwise.
- 2. Turn the adjuster for each shoe clockwise until the shoe just brushes the brake drum, then slacken off two serrations.

Rear

The rear brake shoes are adjusted by means of a single adjuster assembly fitted at the lower side of the brake anchor plate which allows the shoes to expand or contract equally.

- 1. With the rear wheels jacked up ensure that they rotate freely; slacken the adjuster if necessary, by turning anti-clockwise.
- 2. Apply the foot brake to ensure that the shoes are bedded in and turn the adjuster clockwise until the linings brush the brake drum then slacken adjuster off (anti-clockwise) two clicks.

TRANSMISSION BRAKE ADJUSTMENT.

Periodic adjustment of the transmission brake unit will be required; proceed as follows:—

Release the hand-brake. Adjustment is made by means of the adjuster wedge spindle (A) protruding

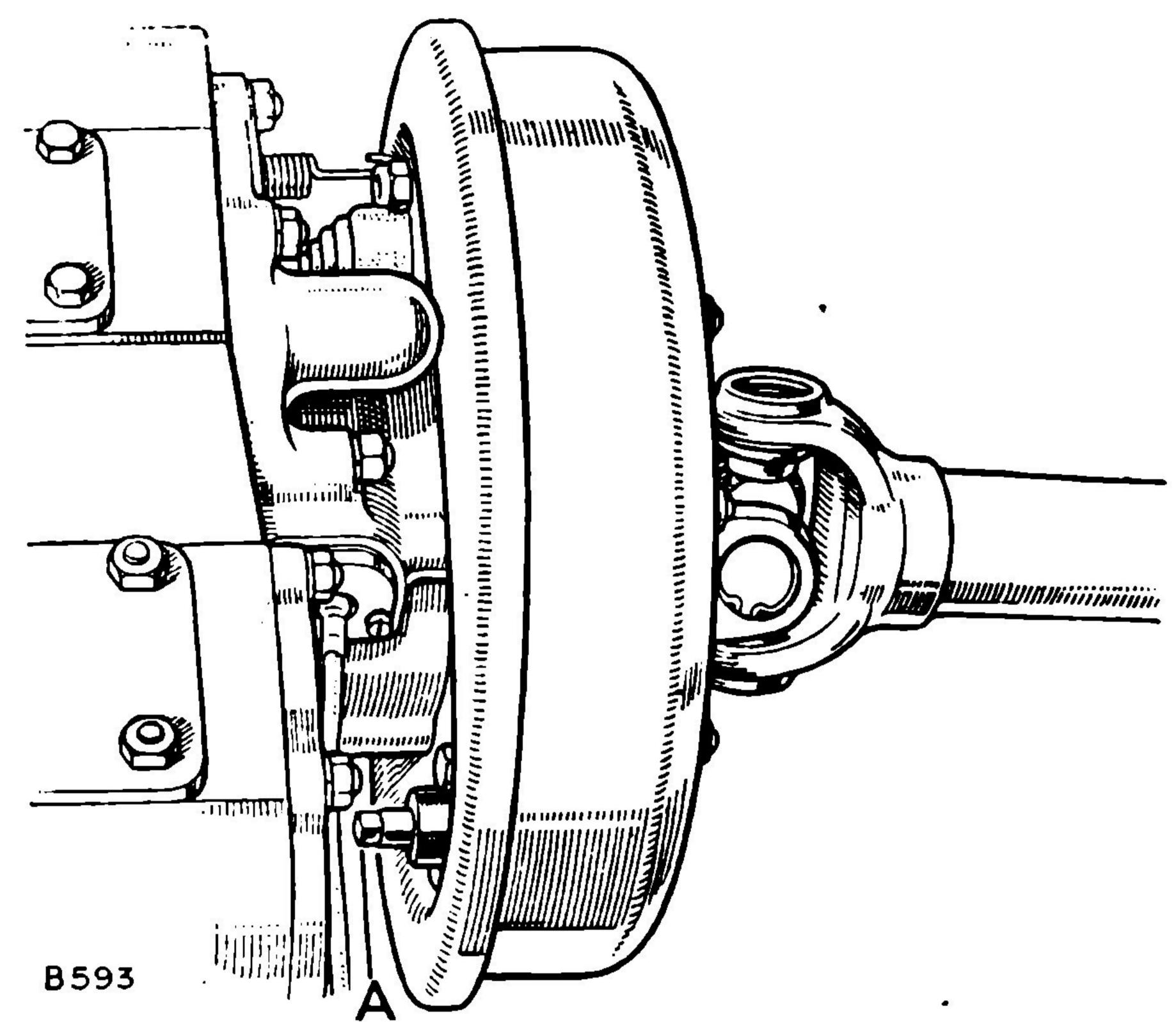


Fig. 29. Transmission brake adjustment.

A—Adjuster.

from the front of the brake back-plate, accessible from beneath the vehicle or after removing the centre seat box panel; during rotation of the adjuster a click will be felt and heard at each quarter revolution. Rotate the spindle as far as possible in a clockwise direction, i.e., until the brake shoes contact the drum. Then unscrew the adjuster two clicks and give the brake a firm application to centralise the shoes; the brake drum should now be quite free to rotate. No other adjustment to the hand-brake system is necessary to compensate for lining wear.

BLEEDING THE BRAKE SYSTEM.

If the level of fluid in the reservoir is allowed to fall too low, or if any section of the brake pipe system is disconnected, the brakes will feel "spongy", due to air having been absorbed into the system. This air lock must be removed by bleeding the hydraulic system at the wheel cylinders; bleeding must always be carried out at all wheels, irrespective of which portion of the pipe-line is affected:—

- 1. Slacken the shoe adjustment bolts right off.
- 2. Attach a length of rubber tubing to the bleed nipple on the wheel unit farthest from the brake pedal and place the lower end of the tube in a glass jar.
- Slacken the bleed screw behind the nipple and pump the brake pedal sharply two or three times and then more slowly, pausing at each end of each stroke, until the fluid issuing from the tube shows no signs of air bubbles when the tube is held below the surface of the fluid in the iar.
- 4. Hold the tube under the fluid surface and tighten the bleed screw.
- 5. Repeat for the other three wheels in turn, finishing at the one nearest the brake pedal.
- 6. Re-adjust the brakes.

The fluid in the reservoir should be replenished throughout the operation, to prevent another air-lock being formed.

FUEL SYSTEM

The fuel system comprises the tank, pipe lines, sediment bowl, pump, carburetter and air cleaner.

It is most important that the entire system be kept clean and free from leaks.

DRAINING THE FUEL SYSTEM.

If the vehicle is to be stored for an extended period, the fuel system should be completely drained to prevent the formation of gum in the pump and carburetter. Remove the drain plug from the bottom of the petrol tank and replace when the tank is empty; then run the engine until the petrol in the pipe-line is exhausted.

SEDIMENT BOWL.

The sediment bowl, inserted in the pipe from the tank to the pump and mounted on the engine side of the dash, serves as the main filter in the fuel system. Should the filter become choked or if an appreciable amount of foreign matter has collected in the bowl, the unit should be cleaned as follows:—

Remove the glass bowl by slackening the thumbscrew and swinging the wire holder aside. Remove the gauze filter from the body of the unit and wash it and the bowl in petrol. Replace the gauze correctly over the square inlet nozzle, ensure that the sealing washer is in good condition and replace the bowl.

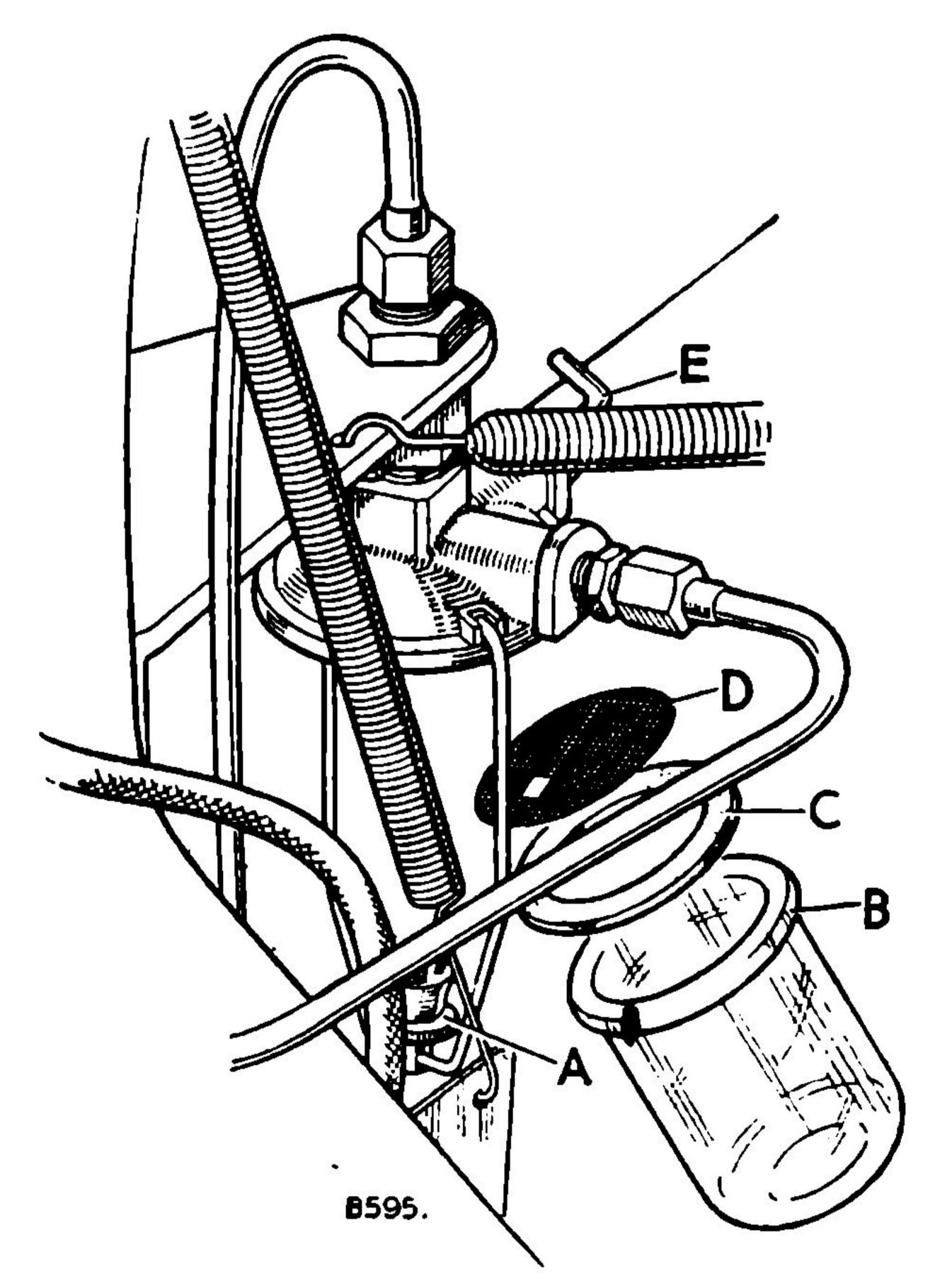


Fig. 30.
Sediment bowl.

A—Thumbscrew.

B—Bowl.

C—Joint washer.

D-Filter gauze.

E-Shut-off tap.

The screw-in petrol shut-off tap protruding from the body of the unit should normally be left open. If desired, when parking the vehicle for a lengthy period, it can be closed to serve as a precaution against theft.

PETROL PUMP.

The petrol pump, mounted on the engine side of the dash, is wired through the ignition; it will operate immediately the ignition is switched on, so filling the carburetter float chamber and ensuring easy starting.

CLEANING PETROL PUMP FILTER.

Should the pump filter become choked, it can be withdrawn by unscrewing the hexagon brass plug in the bottom of the pump body. Clean thoroughly in petrol, using a stiff brush; never use rag for cleaning this type of filter.

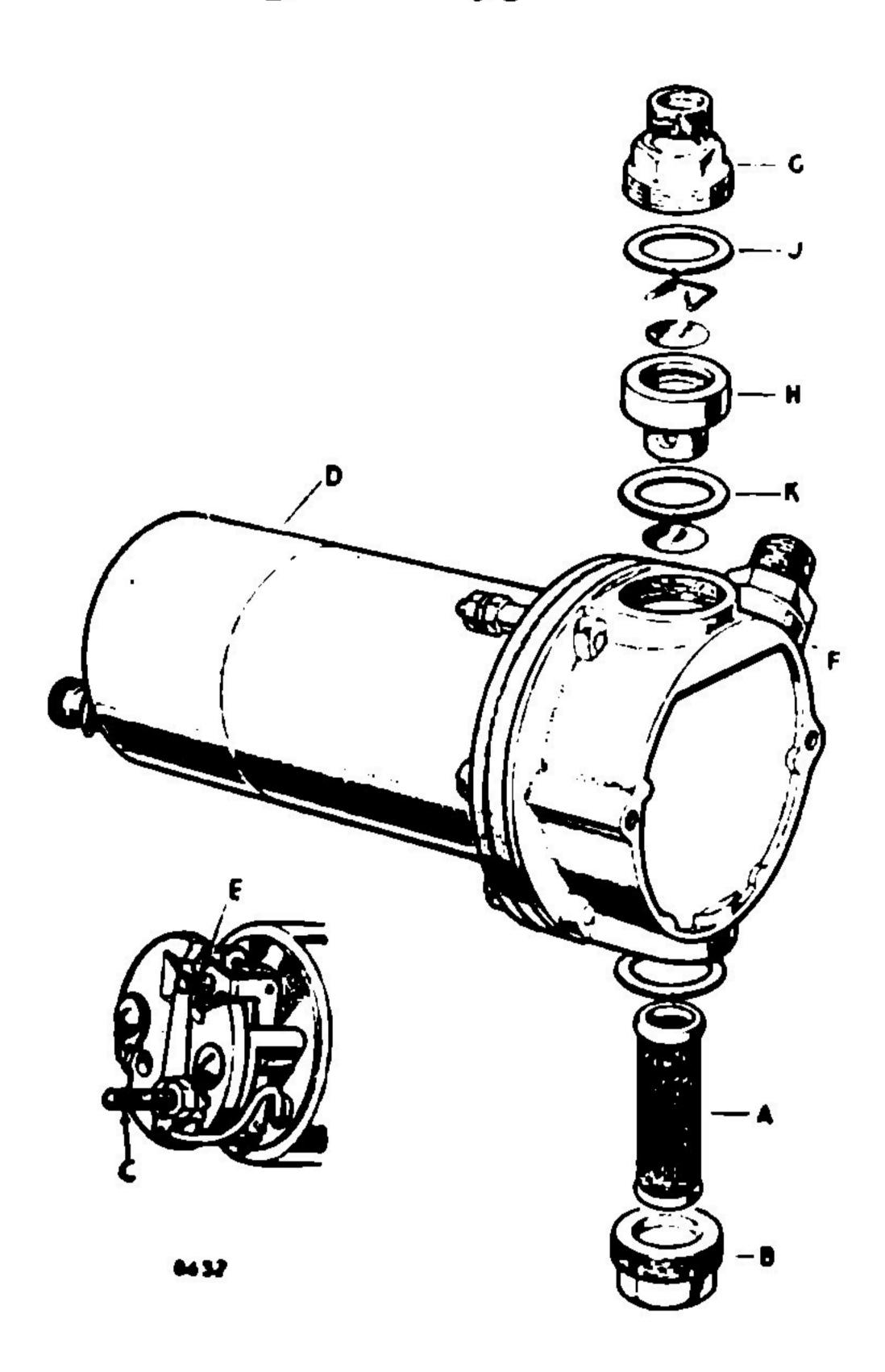


Fig. 31. Petrol pump

A-Gauze filter.

B-Filter plug.

C-Feed terminal.

D-Bakelite cover.

E—Contact points.

F-Inlet union.

G-Outlet union.

H-Valve cage.

J-Thick fibre washer.

K-Thin fibre washer.

PETROL PUMP FAULT LOCATION.

If petrol pump trouble is suspected:—

- 1. Disconnect the pump end of the pipe to the carburetter (upper pipe at pump) and switch on the ignition:—
 - A. If the pump then operates satisfactorily the trouble is due to either:—
 - (i) Blockage of the pipe to the carburettos which can be cleared by blowing down it with a tyre pump.
 - Or (ii) Sticking carburetter sloat needle. To remedy, clean the float chamber and needle valve.
 - B. If the pump still does not operate correctly, the trouble may be due to either:—
 - (i) Blockage of the pump filter, which should be cleaned.
 - (ii) Blockage of the sediment bowl which can be cured by cleaning.
 - (iii) Blockage of the pipe to the sediment bowl or that from the bowl to the tank, which can be cleared by blowing down it with a tyre pump.
 - (iv) Poor connection in the pump wiring. Disconnect the lead from the feed terminal (C) and strike it against a metallic part of the dash; the appearance of sparks will indicate that the current supply is in order.
 - NOTE. Care should be taken during this test, as loose petrol or vapour may cause a fire.
 - Or (v) Dirty pump contact points. Remove the cover (D) and touch the terminal (C) with the lead. If the pump does not operate when the points (E) are in contact and a spark cannot be struck off the terminal, then the points must be cleaned by sliding a piece of card between them.

Failure to locate and rectify the fault in this manner will indicate that the pump itself is at fault and the local Rover dealer should be consulted.

If the pump becomes noisy in operation, allow it to deliver directly into a can; if the delivery pipe is submerged in the petrol and bubbles appear, an air leak on the suction side of the pump is indicated, which must be found and cured.

If the pump becomes hot in operation or keeps on beating without delivering petrol, a choked filter or dirt in the pump valves is indicated. To locate and remove the obstruction in the valve, unscrew the top union (G) from the pump and lift out the valve cage (H). When replacing the cage, ensure that the thin hard fibre washer (K) is below the cage and the thick one (J) above.

AIR CLEANER.

Attention to the air cleaner is extremely important, especially under dusty conditions, as engine wear generally will be seriously affected if the vehicle is run with an excessive amount of sludge in the cleaner oil bath.

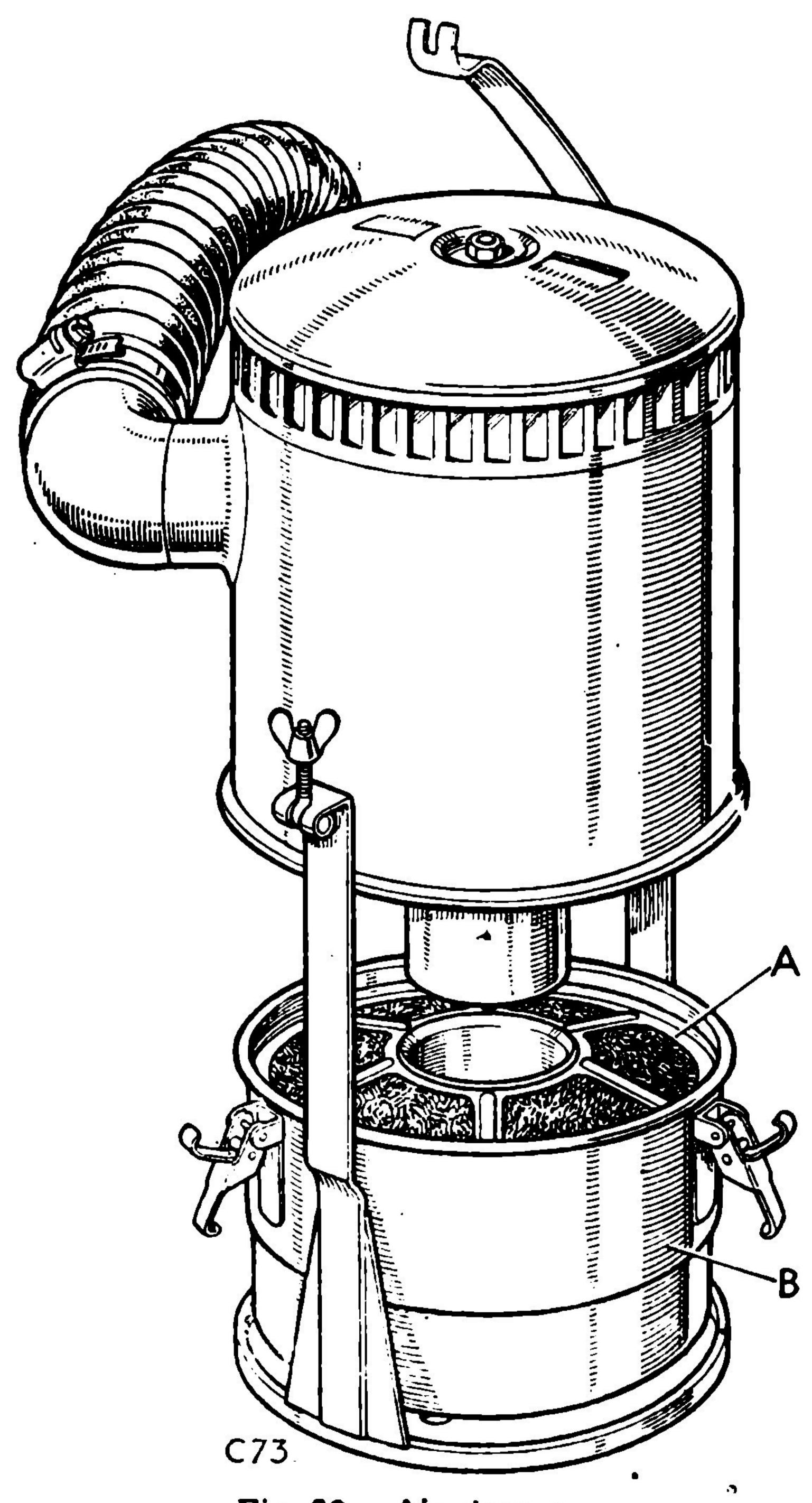


Fig. 32. Air cleaner.

A—Oil bowl.

B—Oil level mark.

Under clean road or stationary conditions, the cleaner oil bath should be cleaned and refilled at each engine oil change. In cases where the vehicle is operated under dusty road or field conditions, attention must be more frequent, even to the extent of a daily oil change; under extremely bad conditions, cleaning twice daily may be called for.

Proceed as follows:—

- Release the clamping strap securing the complete air cleaner to the battery box support, disconnect the outlet elbow from the carburetter intake pipe by slackening the clip and remove the cleaner from the vehicle.
- 2. Remove the oil bowl from the bottom of the cleaner by releasing the three securing clips.
- 3. Clean all dirty oil and sludge from the bowl and refill with fresh engine oil to the level indicated by a ring formed in the pressing; the capacity is approximately 1½ Imperial pints (0,85 litre).
- 4. Clean the filter in the cleaner body by swilling the complete body in petrol or paraffin and shake off the surplus.
- 5. Replace the bowl.
- 6. Resit the complete unit in the vehicle.

CARBURETTER.

The carburetter is adjusted on assembly and, apart from occasional cleaning of the filter, should require no further attention. The only normal adjustment provided is that to obtain smooth engine idling.

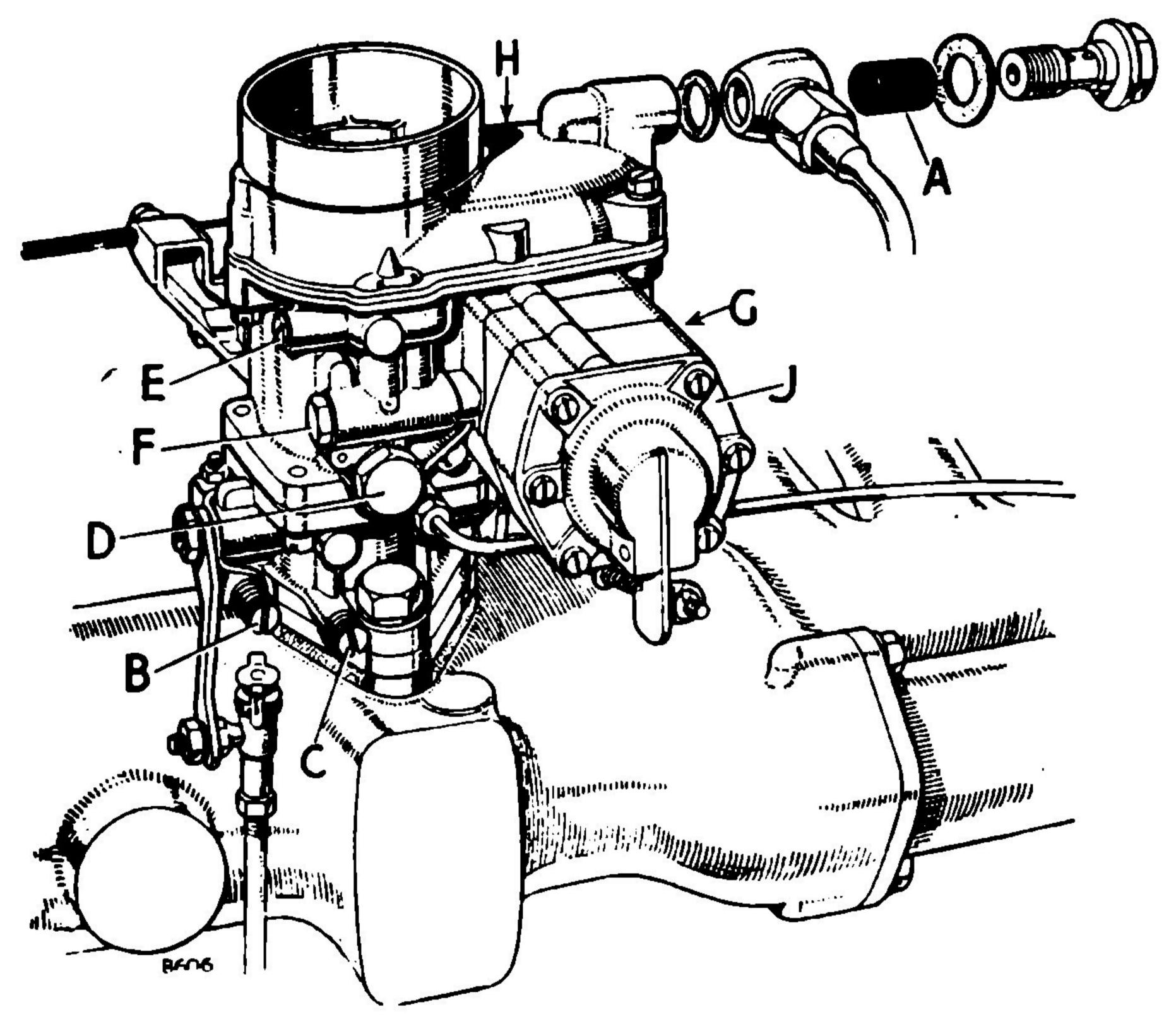


Fig. 33. Carburetter.

A-Filter.

B—Slow-running screw.

C-Volume screw.

D-Main jet.

E-Pilot jet.

F--Pump jet.

G-Economy jet.

H-Starter petrol jet.

J-Accelerator pump.

For a temperate climate and altitudes up to 3,000 ft. (1.000 m.), i.e., as the vehicle is tested initially, the standard carburetter setting is:—

Choke: 25; main jet: 115; correction jet; 240; pilot jet: 55; pump jet: 75; economy jet: 50; air bleed: 1.5; starter air jet: 5.5; starter petrol jet: 135; 135; petrol level: 16 mm. below float chamber joint face.

When operating under other conditions, the carburetter setting may need adjusting to suit; as a general guide, the following settings may be used as a basis to determine such adjustment:—

Tropical conditions. As standard, except main jet: 110.

Altitude setting. As standard, except:—

3,000 to 6,000 ft. (1.000 m. to 2.000 m.) Main jet: 110; air bleed: 2.0.

6,000 to 10,000 ft. (2.000 m. to 3.000 m.). Main jet: 107.5; air bleed: 2.0.

10,000 to 14,000 ft. (3.000 m. to 4.000 m.). Choke: 26; main jet: 107.5; correction jet:

260: air bleed: 2.0.

CLEANING CARBURETTER FILTER.

When necessary, disconnect the petrol pipe from the carburetter and withdraw the gauze filter from the float chamber cover. Clean the filter in petrol, using a stiff brush.

CARBURETTER SLOW-RUNNING ADJUSTMENT.

It may occasionally become necessary to adjust the slow-running qualities of the carburetter, in which case proceed as follows:—

- 1. Run the engine until it is hot—never set the idling with a cold engine.
- 2. Set the slow-running screw until the idling speed is rather high.
- 3. Slacken the volume screw until the engine begins to hunt.
- 4. Screw it in very gradually until the hunting just disappears.
- 5. If the engine speed is too high, reset the slow-running screw to slow it down to an idling speed of about 500 r.p.m.
- 6. This may cause a resumption of slight hunting. If so, turn the volume control screw gently in a clockwise direction until the idling is once more satisfactory.

CLEANING CARBURETTER JETS.

Reference is made in the "IN CASE OF TROUBLE" section on Page E-37 to carburetter jet cleaning.

It is most unlikely that trouble will be experienced with blocked jets, but the following notes will assist in location of jets which may need cleaning:—

- 1. Main petrol jet; the jet proper is screwed in to the inner end of the carrier, which must be removed to gain access to the jet.
- 2. Pilot jet has a screwdriver slot in the hexagon head.
- 3. Accelerator pump jet is located between the main and pilot jets.
- 4. Economy jet is located at the side of the accelerator pump housing, opposite the pump jet.
- 5. Starter petrol jet is a plain hexagon-headed unit at the rear of the carburetter.

COOLING SYSTEM

COOLING SYSTEM MAINTENANCE.

It is a good plan to inspect the cooling system at the same time as the engine oil level is checked; such care would largely prevent the possibility of a sudden and costly delay due to coolant loss and consequent engine damage. Attention should be paid to the following points:—

- 1. Water level in radiator—to the bottom of the filler neck.
- 2. Condition of all hoses—freedom from cracks and hose clips tight.
- 3. Any other water leaks.
- 4. Check that the drain taps are fully closed.

FAN BELT ADJUSTMENT.

As the fan belt is of the "V" type, the drive is on the sides of the belt and it is not therefore necessary to adjust it tightly and so put an excessive load on the water pump and dynamo bearings; the tension is correct when the belt can be depressed \(\frac{1}{2}\) to \(\frac{3}{4}\) in. (12 to 19 mm.) by thumb pressure between the fan and crankshaft pulleys. The procedure for adjustment is as follows:—

Slacken the three dynamo pivot bolts and the bolt securing the dynamo to the adjusting link. Move the dynamo outwards until the tension is correct and re-tighten the bolts.

DRAINING THE COOLING SYSTEM.

As a precaution against corrosion, the cooling system should be drained and flushed out at least twice each year in the following manner:—

- 1. Remove the radiator filler cap (see Page E-12).
- 2. Open the water drain taps at the bottom of the radiator and on the right-hand side of the cylinder block at the rear.

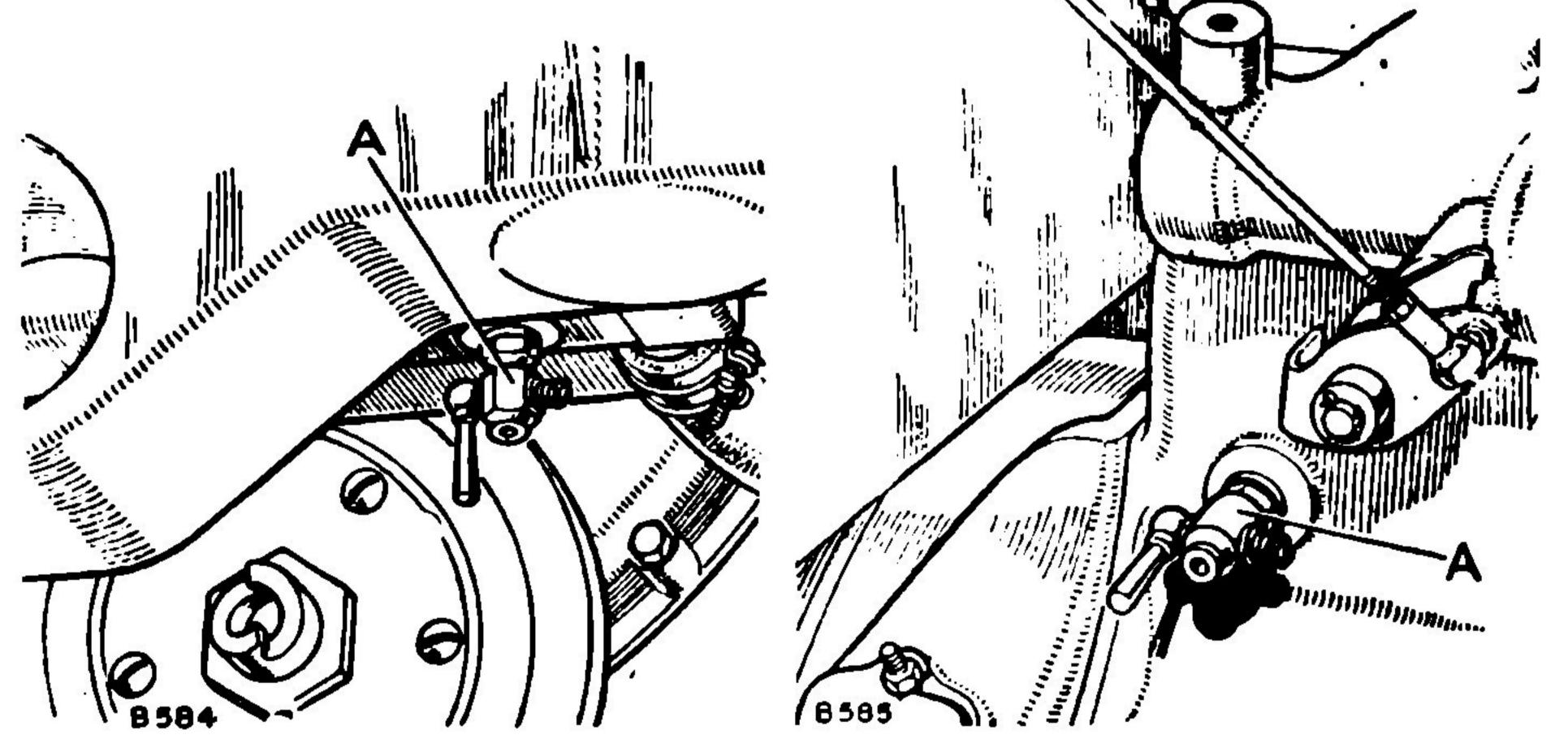


Fig. 34. Drain taps.

A—Drain tap.

- 3. When the water flow has ceased, insert a piece of wire in each tap, to make sure that a blockage has not been caused by rust or scale.
- 4. Place a hose in the radiator filler neck and adjust the flow of water to equal that draining from the taps.
- 5. Run the engine for a short time to ensure thorough cleaning of the whole system.
- 6. Switch off the engine, remove the hose and close the taps. Refill the system with clean water to the bottom of the filler neck and replace the filler cap. The total capacity is 17 Imperial pints (9,5 litres).

NOTE. Use soft water wherever possible; if the local water supply is hard, rain or distilled water should be used.

7. Run the engine until working temperature is reached and top up the water level as necessary.

CLEANING RADIATOR.

In the event of the cooling gills of the radiator becoming blocked with dirt, straw, etc., they should be cleaned by means of compressed air or water pressure applied from the rear, so forcing the foreign matter out through the front of the radiator. Never use a metal implement for this purpose or serious damage may result to the radiator core.

FROST PRECAUTIONS.

In cold weather, when the temperature may drop to or below freezing point, precautions must be taken to prevent freezing of the water in the cooling system.

As a thermostat is fitted in the system, it is possible for the radiator block to freeze in cold weather even though the engine running temperature is quite high; for this reason, the use of an anti-freezing mixture is essential.

Only high quality inhibited glycol-base solutions should be used.

When the temperature is between 32° F and 14° F (0° C and minus 10° C) use 1 part of anti-freeze to 4 parts of water. If the temperature is between 5° F and 14° F (minus 10° C and minus 15° C) use 1 part of anti-freeze to 3 parts of water.

Proceed as follows:—

- 1. Ensure that the cooling system is leak-proof; anti-freezing solutions are far more "searching" at joints than water.
- 2. Drain and flush the system as described on this page.
- 3. Mix the solution to the required strength in a separate container and refill the system.
- 4. Run the engine to ensure good circulation of the mixture.

When the winter is over, as a precaution against corrosion, the anti-freezing solution should be drained off and the system flushed thoroughly again.

If the vehicle is to be stored in cold weather, unless it is kept in a well-heated garage or anti-freeze solution has been used, the cooling system must be completely drained. After the water has drained out, it is well to run the engine at a fast idling speed for not more than half a minute, so as to dry out any water that may have been retained in the bottom of the jacketing.

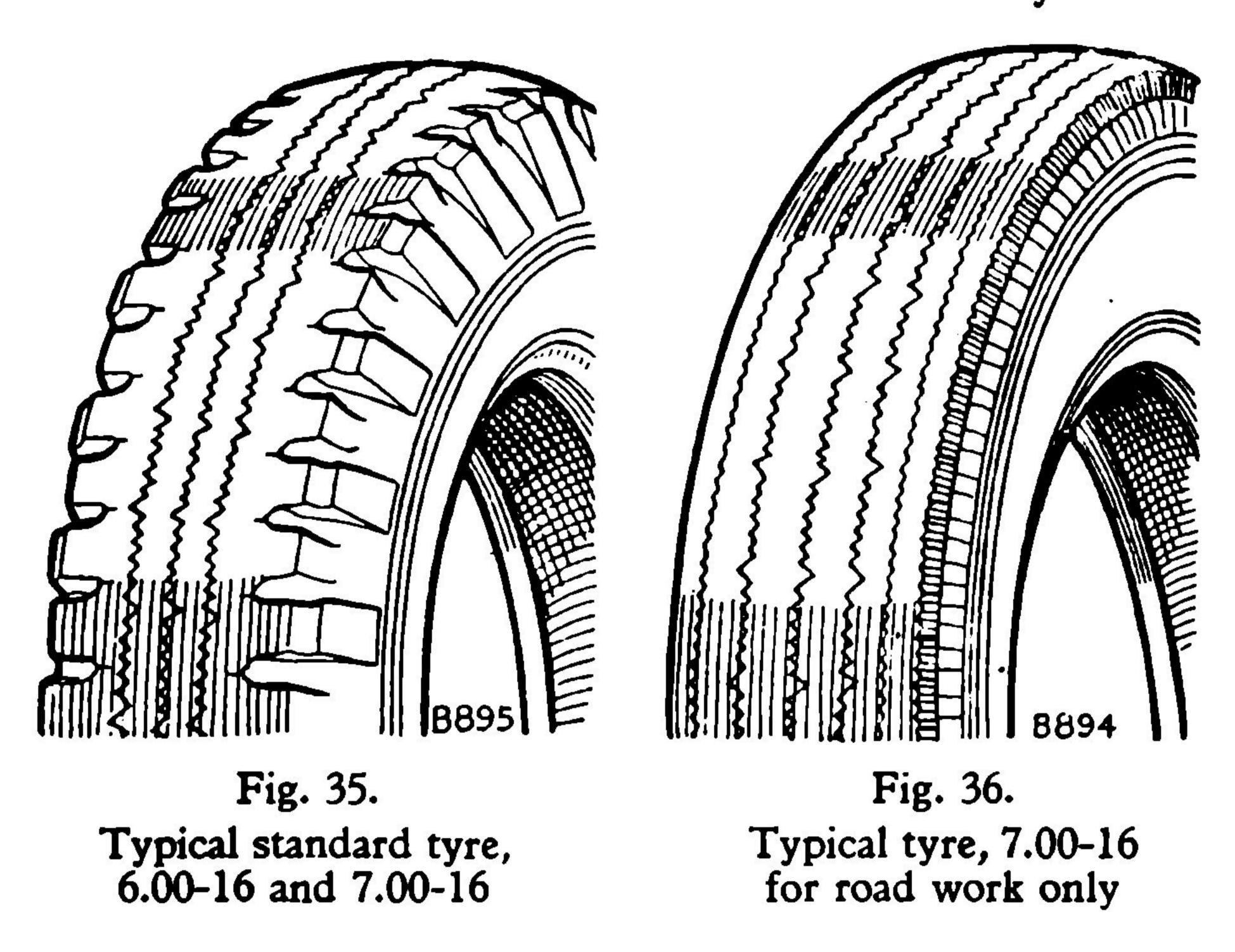
NOTE. During the winter months, in Britain, vehicles leaving the Rover Factory have the cooling system filled with 25% of Antifreeze mixture. This gives protection against frost down to 0° F (minus 17° C). Vehicles so filled can be identified by the Yellow label affixed to the right-hand side of the windscreen and a Yellow label tied to the engine.

If the prevailing weather makes the use of anti-freeze mixture unnecessary when the vehicle is received, the cooling system must be drained, flushed and refilled as a precaution against corrosion. The Yellow labels should be removed from the windscreen and engine when this has been carried out.

WHEELS AND TYRES

The standard tyre equipment for the Land-Rover 86 and 88 is the 6.00-16 size; this is a dual-purpose tyre. It is suitable for general cross-country work including towing and is serviceable both on and off the road.

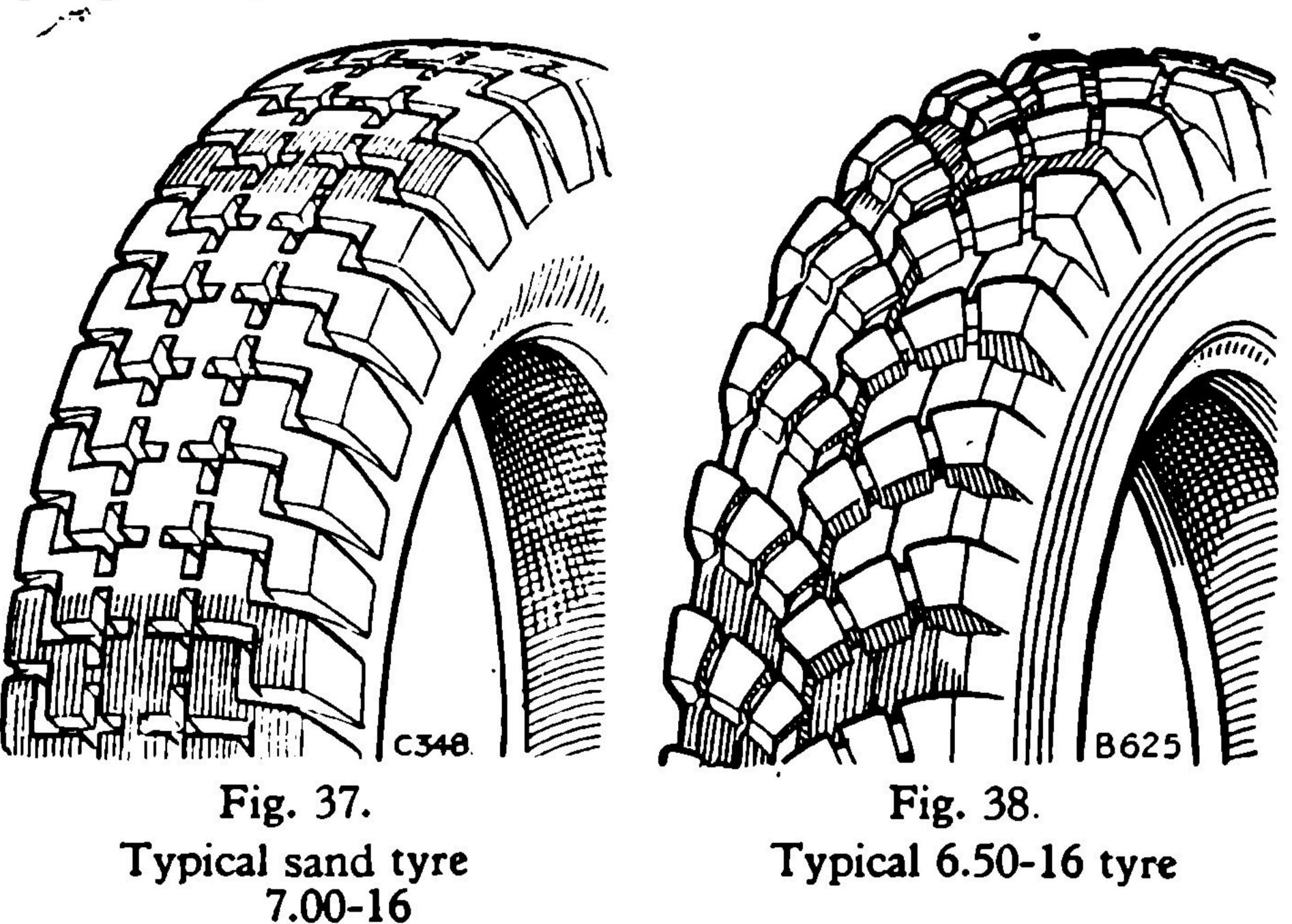
Alternatively, 6.50-16 tyres may be fitted as original equipment on the Land-Rover 86 and 88; they are also dual-purpose tyres, but provide rather better traction off the road than the 6.00-16 tyre.



7.00-16 tyres are fitted as standard on the Land-Rover 107 and 109.

For certain special conditions, alternative tyres are recommended.

1. SOFT MUDLAND AND PLOUGHLAND, etc., especially when towing on such surfaces. Under such conditions, greater wheel grip and maximum power are required and can be obtained from the 7.00-16 Tractor pattern tyres. Their special tread design with deep, widely-spaced bars is ideal, but they are noisy and will wear rapidly if used extensively on hard dry surfaces and on the road. They must be regarded, therefore, as special purpose tyres.



2. ROAD USE. Where exceptional conditions cause the majority of service to be on road and the vehicle will not be expected to operate on soft ground, best service will be obtained by fitting 6.00-16 or 7.00-16 car type tyres.

3. SURFACES WHERE MINIMUM CONTACT PRESSURES ARE REQUIRED, e.g., SANDY DESERT. Under such conditions 7.00-16 sand type tyres are recommended.

TYRE PRESSURES.

Careful attention must be given to the question of correct tyre pressures if maximum tyre life and performance are to be obtained.

1. For normal road and cross-country work, tyre pressures must be maintained at:—

Land Rover. All models

Front and Rear:
25'lb. per sq. in. (1,75 kg./cm.².)

When loads in excess of 550 lb. (250 kg.) are carried in the rear of the vehicle, pressures in the rear tyres only must be raised to:

Land-Rover 86 and 88:

30 lb. per sq. in. (2,1 kg./cm.2).

Land-Rover 107 and 109:

32 lb. per sq. in. (2,25 kg./cm.²).

2. Should it be desired to traverse exceptionally soft ground, the tyre pressures may be reduced to:—

Land-Rover 86 and 88

Front and Rear:

6.00-16 tyres: 15 lb. per sq. in. (1,05 kg./cm.²). 6.50-16 tyres: 15 lb. per sq. in. (1,05 kg./cm.²). 7.00-16 tyres: 13 lb. per sq. in. (0,9 kg./cm.²).

When loads in excess of 550 lb. (250 kg.) are carried in the rear of the vehicle, pressures in the rear tyres only must be raised to:—

6.00–16 tyres: 20 lb. per sq. in. (1,4 kg./cm.²). 6.50–16 tyres: 20 lb. per sq. in. (1,4 kg./cm.²). 7.00–16 tyres: 18 lb. per sq. in. (1,25 kg./cm.²).

Land-Rover 107 and 109

Unladen Front and Rear:

16 lb. per sq. in. (1,15 kg./cm.2).

Laden Front: 18 lb. per sq. in. (1,25 kg./cm.2).

Rear: 24 lb. per sq. in. (1,7 kg./cm.2).

Reduced pressures must only be employed when absolutely essential and the pressures must be returned to normal immediately after the soft ground has been negotiated.

Pressures should be checked and adjusted monthly, paying attention to the following points:—

- 1. Whenever possible, check with the tyres cold, as the pressure is about 2 lb. (0,1 kg.) higher at running temperature.
- 2. Always replace the valve caps, as they form a positive seal on the valves.
- 3. Any unusual pressure loss (in excess of 1 to 3 lb. (0,05 to 0,20 kg.) per month) should be investigated and corrected.
- 4. Always check the spare wheel, so that it is ready for use at any time.
- At the same time, remove embedded flints, etc., from the tyre treads with the aid of a penknife or similar tool. Clean off any oil or grease on the tyres, using petrol sparingly.

TYRE TREADS

The tread form of the special purpose tyres makes them uni-directional. They must be fitted with the V or arrow in the tread pattern pointing forwards at the top of the wheel, to ensure maximum grip and efficient tread cleaning when operating on soft ground. For this reason, it may be necessary to reverse the spare tyre on its wheel (depending on which side of the vehicle it is to be fitted) when putting it into service.

CHANGING TYRE POSITIONS

In the interests of tyre mileage and even wear, it is desirable to change the position of the tyres on the vehicle (including the spare) at intervals of 3,000 miles (5.000 km.). The front and rear wheels should be interchanged on each side of the vehicle; at the same time, the spare wheel should be fitted to give it a spell of duty and one of the other wheels removed to become the spare.

FACTORS AFFECTING TYRE LIFE.

The most important factors, among many which have an adverse effect on tyre life, are:—

- 1. Incorrect tyre pressures.
- 2. High average speeds.
- 3. Harsh acceleration.
- 4. Frequent hard braking.
- 5. Warm, dry climatic conditions.
- 6. Poor road surfaces.
- 7. Impact fractures caused by striking a kerb or loose brick, etc.
- 8. Incorrect front wheel alignment. Alignment should be checked periodically by a Rover dealer and adjusted as necessary.

WHEELS.

As standard equipment, well-base wheels are fitted, but divided type wheels, identified by the ring of bolts securing the two halves together, are available as original equipment as an optional extra. Either pattern wheel may be used with 6.00-16 or 7.00-16 tyres, although 7.00-16 Tractor type tyres are more readily fitted to the divided type. Rubber protection flaps must be fitted when divided wheels are used

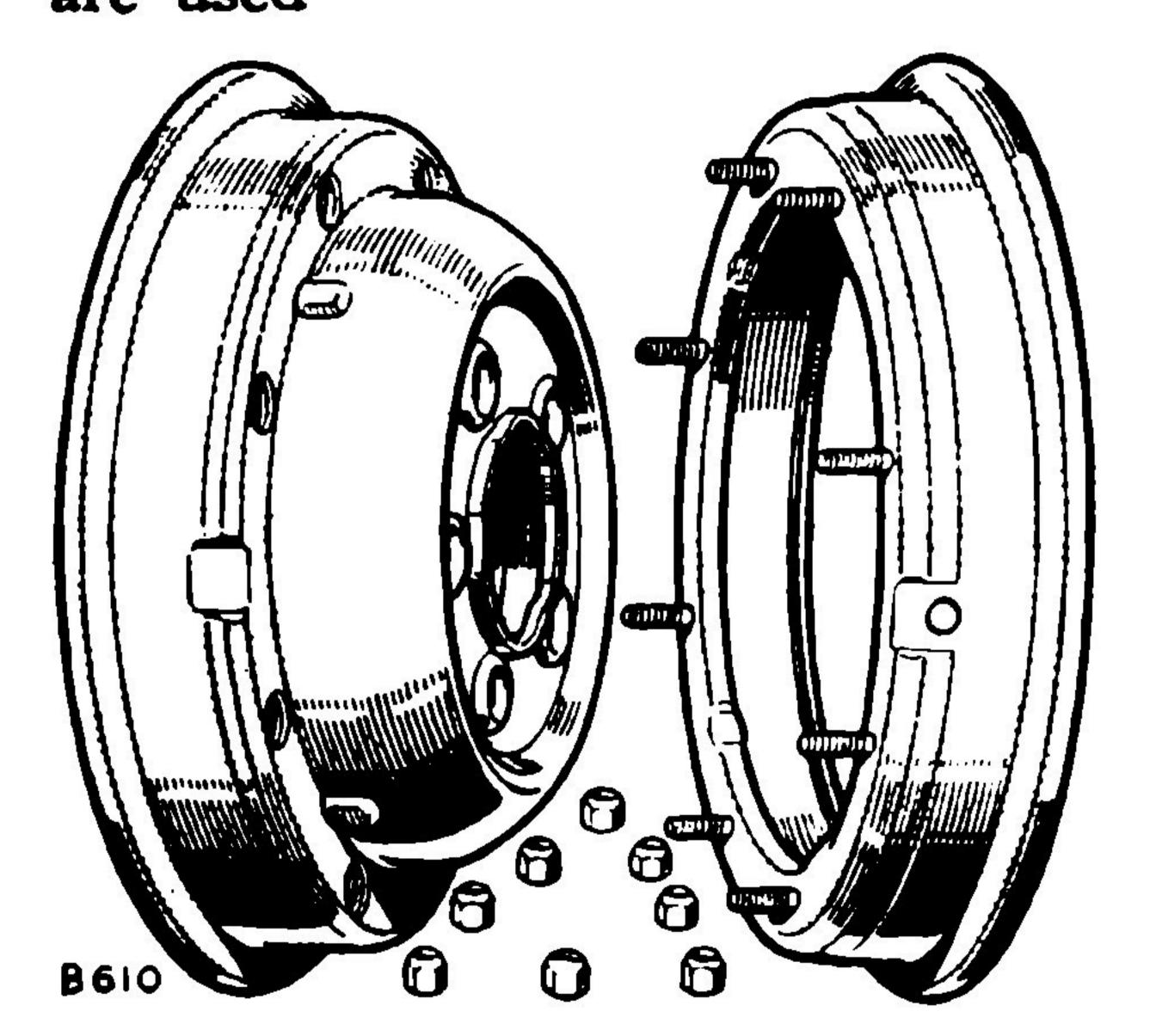


Fig. 39.
Divided wheel.

NOTE: DIVIDED WHEELS. Under no circumstances must the clamping nuts, which hold the two halves of the wheel together, be slackened unless the tyre is fully deflated. Failure to observe this rule may result in damage to the equipment and will certainly involve the risk of personal injury.

TYRE REMOVAL—WELL-BASE WHEELS.

As inextensible wires are incorporated in the beads of the outer cover, the beads must not be stretched over the wheel rim. The operation will be more easily carried out if the cover beads are lubricated liberally with water, preferably with a little soap added. Tyre levers should be dipped before each insertion. The correct method of tyre removal is as follows:—

- 1. Remove the valve cap and core (using the extractor provided in the tool kit) and deflate the tyre.
- 2. Press each bead in turn off its seating. Insert a lever at the valve position and, while pulling on this lever, press the bead into the well diametrically opposite the valve.
- 3. Insert a second lever close to the first and prise the bead over the wheel rim. Continue round the bead in small steps until it is completely off the rim.
- 4. Remove the inner tube and pull the second bead over the rim.

Minor tyre injuries, such as from nails, require no attention other than removal of the object, but more severe tread or wall cuts require vulcanised repairs.

Avoid the use of gaiters or liners except as a temporary expedient.

"Butyl" synthetic inner tubes are fitted and all repairs must be vulcanised.

TYRE REPLACEMENT—WELL-BASE WHEELS.

Outer covers and tubes marked with balance spots should be fitted so that the white spots near the cover bead coincide with the black spots across the base of the tube. This achieves a high degree of tyre balance.

- 1. Place the cover over the wheel and press the lower bead over the rim edge into the well.
- Inflate the inner tube until it is just rounded out and insert it in the cover.
- 3. Press the upper bead into the well diametrically opposite the valve and lever the bead over the rim edge.
- 4. Push the valve inwards to ensure that the tube is not trapped under the bead, pull it back and inflate the tyre.
- 5. Check the concentricity of the fitting line on the cover and the top of the wheel flange. Deflate the tube completely and re-inflate to the correct pressure, to relieve any strains in the tube.

TYRE REMOVAL—DIVIDED WHEELS.

Do not touch the nuts securing the two halves of the wheel together before the tyre is deflated or serious personal injury may result.

Remove the tyre as follows:—

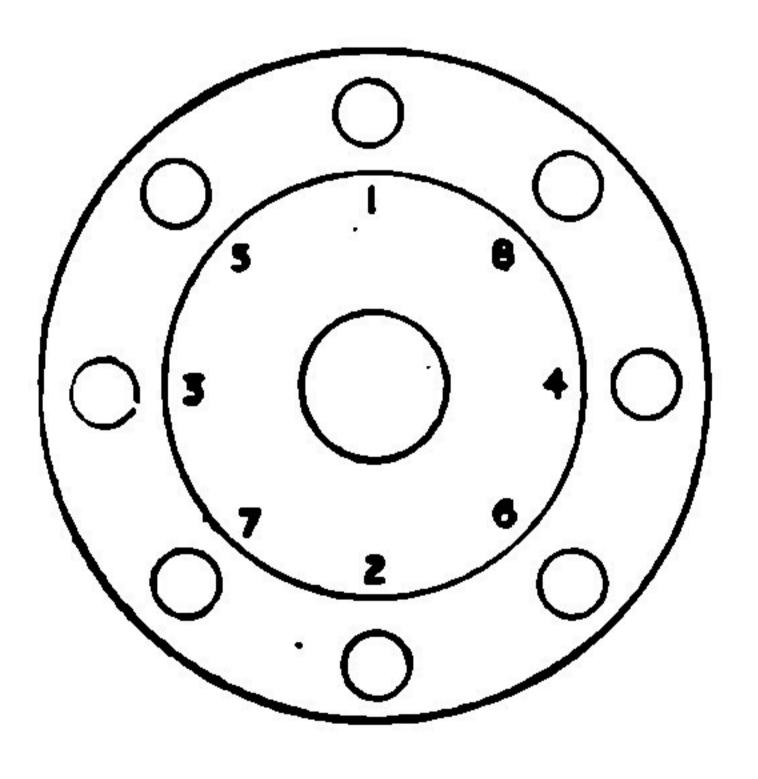
- 1. Remove the valve cap and core to deflate the tyre.
- 2. Press each bead in turn away from the flange, using levers and working round the tyre in small steps. Two or three circuits of the tyre may be necessary to free the beads completely.
- 3. Slacken and remove the clamping nuts. Remove the upper half of the wheel. Push the valve through the lower half of the wheel and remove the cover and tube.

Minor tyre injuries, such as from nails, require no attention other than removal of the object, but more severe tread or wall cuts require vulcanised repairs. Avoid the use of gaiters or liners except as a temporary expedient.

"Butyl" synthetic inner tubes are fitted and all repairs must be vulcanised.

TYRE REPLACEMENT—DIVIDED WHEELS.

- 1. Thoroughly examine the cover for nails, flints, etc., and ensure that no loose objects have been left inside. Clean the wheel rim flanges and seatings.
- 2. Inflate the inner tube until it is just rounded out, dust with French chalk and insert it in the cover with the white spots near the cover bead coinciding with the black spots on the tube.
- 3. Fit the protection flap, starting at the valve position. Make sure that the edges of the flap are not turned over inside the cover and that it lies centrally between the beads. See that the flap fits closely against the tube round the valve.
- 4. Lay the studded half of the wheel on the floor or bench with the studs pointing upwards. Fit the cover over the wheel and thread the valve through the hole, making sure that it points downwards.
- wheel and tighten the clamping nuts lightly. Finally tighten the nuts in the sequence illustrated. Check that the valve is free and inflate the tyre to the recommended pressure.



WHEEL AND TYRE BALANCE.

Wheel and tyre units are accurately balanced on initial assembly with the aid of small weights secured to the inner side of the wheel slot flanges by means of set bolts. In the interests of smooth riding and even tyre wear, it is advantageous for a Rover dealer to check the balance whenever a tyre is refitted.

ELECTRICAL EQUIPMENT

BATTERY.

The positive earth 12-volt battery is carried under the bonnet on the right-hand side.

At regular intervals (see Page E-16), check the battery level as follows:—

- 1. Wipe all dirt and moisture from the battery top.
- 2. Remove the filler plug from each cell in turn. If necessary add sufficient distilled water to raise the level to the top of the separators. Replace the filler plug. Avoid the use of a naked light when examining the cells.

In hot climates it will be necessary to top-up the battery at more frequent intervals.

In very cold weather it is essential that the vehicle be used immediately after topping-up, to ensure that the distilled water is thoroughly mixed with the electrolyte. Neglect of this precaution may result in the distilled water freezing and causing damage to the battery.

Occasionally check the condition of the battery by measuring the specific gravity of the electrolyte in each cell, using a hydrometer. Specific gravity readings and their indications are as follows:—

1.280 to 1.300 (32° to 34° Baumé)
Battery fully charged.

About 1.210 (25° Baumé)

Battery about half discharged.

Below 1.150 (19° Baumé) Battery fully discharged.

These figures assume an electrolyte temperature of 60° F. (15.5° C.). If one cell gives a reading very different from the rest, it may be that acid has leaked from that particular cell, or there may be a short circuit between the plates, in which case the battery should be inspected at a service depot.

Never leave the battery in a discharged condition for any length of time; it should be given a short refreshing charge every fortnight, to prevent permanent sulphation of the plates.

NOTE. If the vehicle is to be left in the open in very cold weather, care must be taken to ensure that the battery is in a good state of charge, otherwise there is danger of the electrolyte freezing and consequent damage to the battery.

If the battery lugs have been removed for any reason they must always be refitted as follows:—

- 1. Clean terminal post and inside of the battery lug.
- 2. Fit lug to terminal post and lightly tap on to the taper of the post.
- 3. Smear vaseline or anti-corrosion grease in the hole for the retaining screw.
- 4. Replace screw taking care not to overtighten. On no account must the screw be used for pulling down the lug.

DYNAMO.

Periodically (see Page E-17), the dynamo must be lubricated at the commutator end bearing by inserting the nozzle of a pump type oil can in the small central hole and injecting just sufficient engine oil to moisten the lubricating pad.

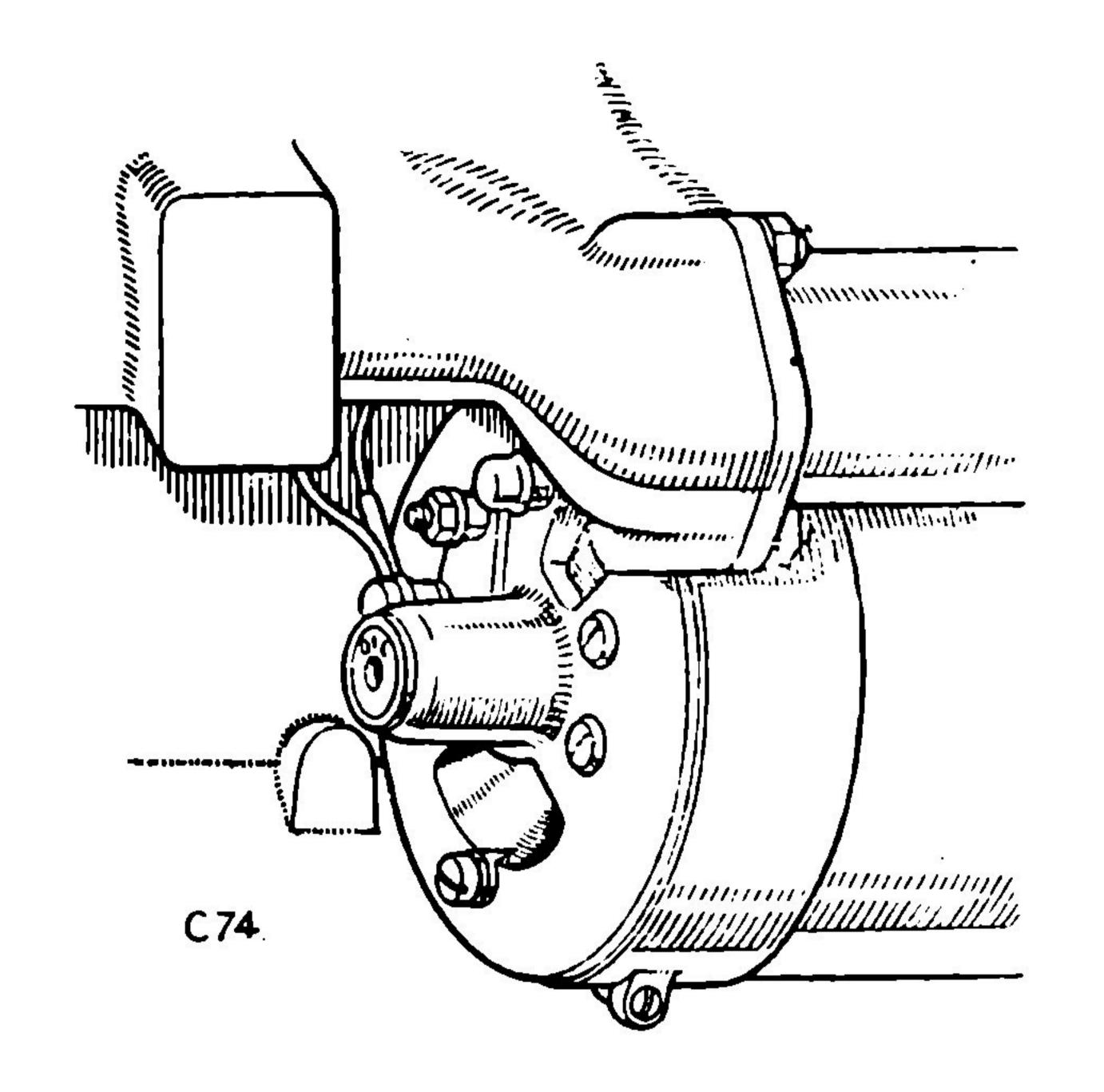


Fig. 40. Dynamo lubrication.

VOLTAGE CONTROL BOX.

This unit is mounted on the engine side of the dash and houses the cut-out and dynamo voltage regulator, which are accurately set before leaving the works and should not normally require any further attention.

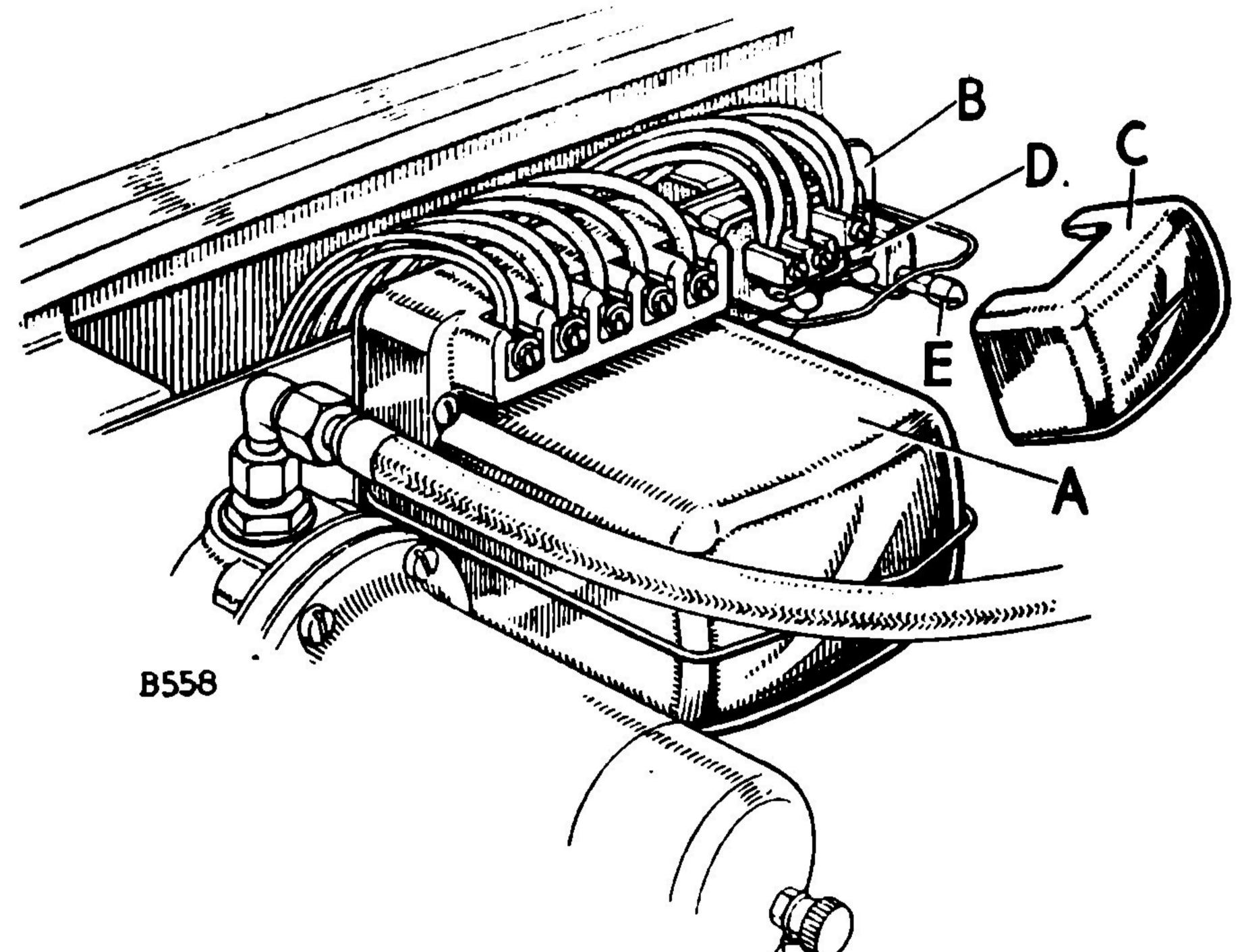


Fig. 41. Voltage control and fuse boxes.

A—Voltage control box. B—Fuse box. C—Fuse box cover.

D—Fuse (35 amp.). E—Spare fuse.

FUSE.

The single fuse is housed under a separate cover alongside the voltage control box; it protects the horn, windscreen wiper, fuel tank level unit and the stop lights.

All other electrical components are not fused.

A blown fuse is indicated by the failure of all the units protected by it and is confirmed by examination of the fuse. Before replacing a blown fuse, locate and remedy the fault in the wiring of the units which have failed. If the cause of the trouble cannot be found and a new fuse blows immediately, the vehicle should be examined at a service depot.

A spare fuse is carried in the fuse box; only 35 amp. cartridge type fuses must be used.

STARTER.

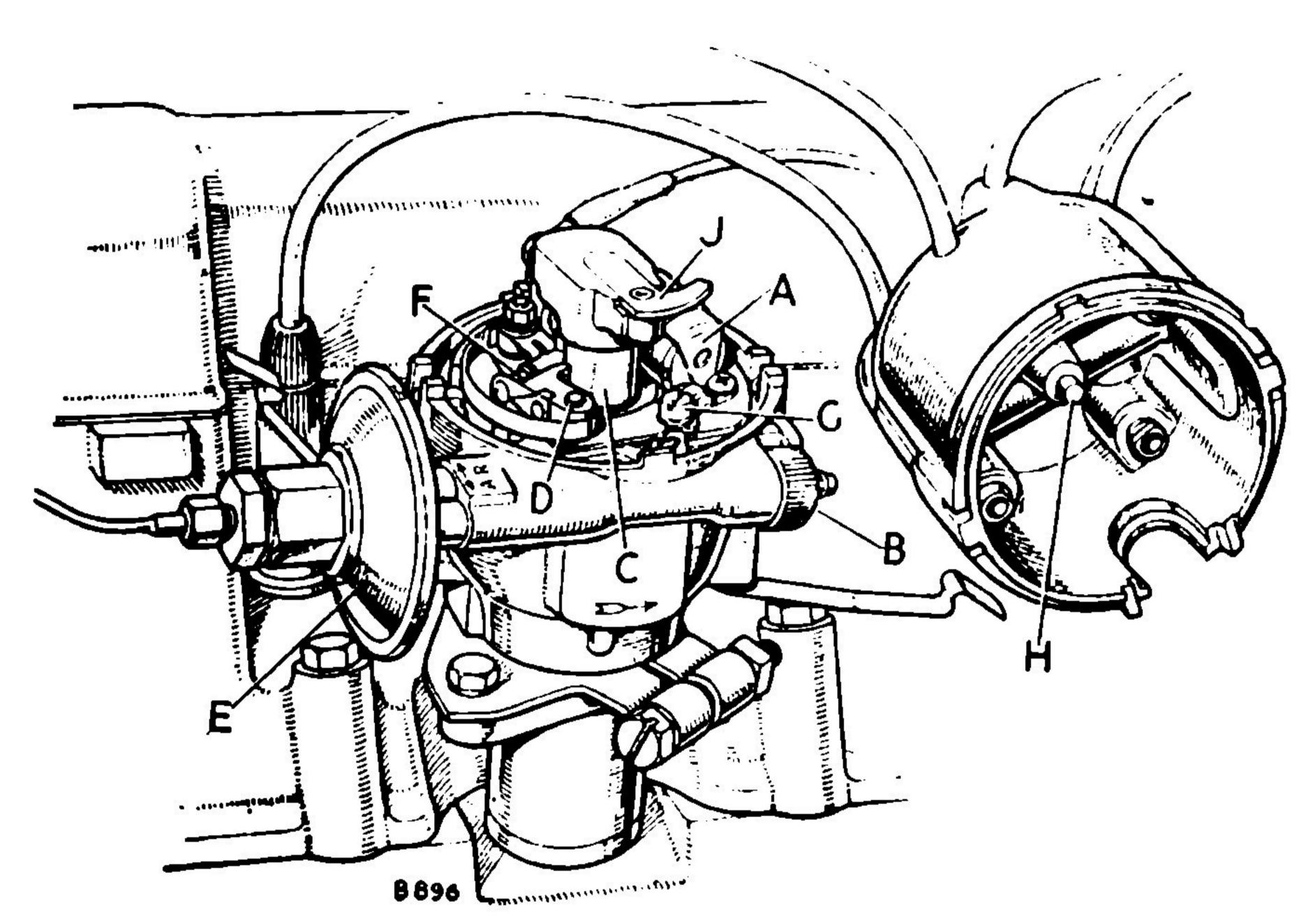
In the event of the starter pinion becoming jammed in mesh with the flywheel, it can usually be freed by withdrawing the dust cap and turning the starter armature by means of a spanner applied to the shaft extension at the commutator end.

DISTRIBUTOR.

DISTRIBUTOR MAINTENANCE.

At regular intervals (see Page E-16), remove the distributor cap and lubricate as follows:—

- 1. Lightly smear the cam with clean engine oil.
- 2. Lift off the rotor and add a few drops of thin machine oil to lubricate the cam bearing and distributor shaft; push the rotor on the shaft as far as possible.
- 3. Place a drop of clean engine oil on the contact breaker lever pivot, taking care not to oil the contacts.
- 4. Add a few drops of thin machine oil through the hole marked "OIL HERE" in the contact breaker base plate, to lubricate the automatic timing control.



Distributor. Fig. 42.

- A-Condenser. B—Octane selector. C—Cam.
- F—Contact points. G—Screws securing movable
- D-Contact breaker pivot.
- H—Carbon brush.

contact.

Rotor arm. E--Vacuum unit.

Periodically (see Page E-17), clean the distributor as follows:—

- Wipe the inside and outside of the cap with a soft, dry cloth; ensure that the small carbon brush works freely in its holder.
- Slacken the nuts on the terminal block and lift off the spring and moving contact. Ensure that the contacts are free from grease or oil; if they are burned or blackened, clean with a fine carborundum stone or very fine emery cloth and wipe with a petrol-moistened cloth. Replace the moving contact.
- 3. Check and adjust the contact breaker clearance · as follows:—
 - (i) Remove the distributor cap and turn over the engine by hand until the contacts are fully open.
 - (ii) The clearance should be .014 to .016 in. (0,35 to 0,40 mm.) i.e., the feeler gauge supplied in the tool kit should be a sliding fit between the contacts.

- (iii) If necessary, slacken the two screws which secure the adjustable contact and move the plate until the clearance is correct; retighten the screws.
- (iv) Replace the distributor cap.

HIGH TENSION CABLES.

7 mm. rubber covered ignition cable must be used for replacement purposes when the original cable is cracked or perished. Connections are made as follows:—

- 1. To coil. Pass the moulded nut over the cable, bare the end of the cable, thread the wire through the washer from the original cable and bend back the wire strands.
- 2. To distributor. Unscrew the pointed fixing screws on the inside of the distributor cap and push the cables, which should not be bared but cut off flush to the required length, well home into their respective terminals and tighten the fixing screws. The screw securing the centre cable is accessible when the carbon brush is removed:

HORN.

86 and 107.

The horn is adjusted on initial assembly and should not require attention for a considerable time. Adjustment merely takes up wear of moving parts and does not alter the pitch of the note; proceed as follows:—

1. Ascertain that the horn failure or faulty note is not due to some outside source, such as a discharged battery, loose connection, loose part adjacent to the horn, etc.

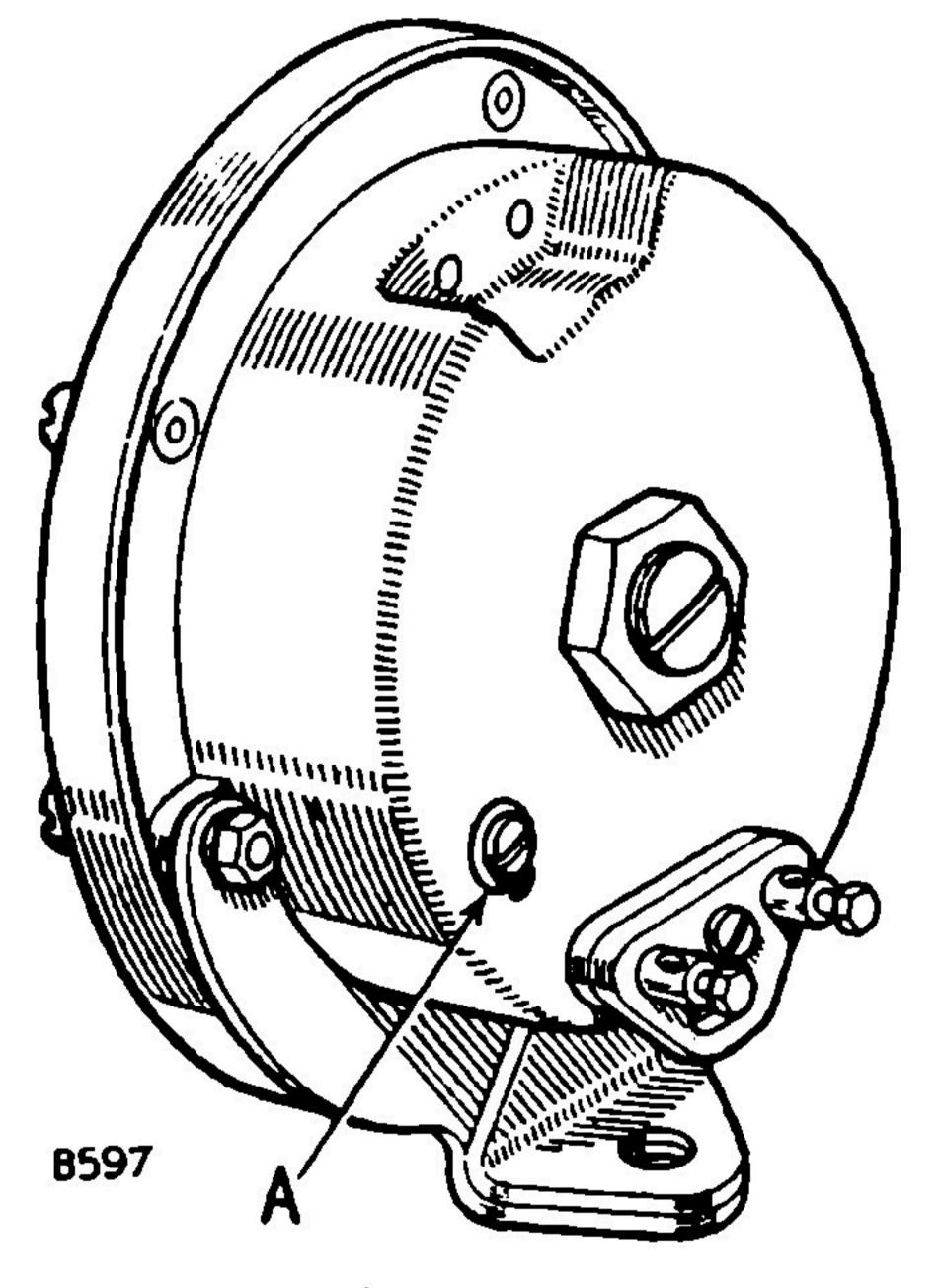


Fig. 43. Horn adjustment.

A—Adjusting screw.

- Operate the horn push and turn the adjustment screw anti-clockwise until the horn just fails to sound.
- 3. Release the horn push and turn the screw clockwise for six "clicks" (one quarter turn) when the original performance should be restored.
- 4. If the note is still unsatisfactory, the horn should be examined at a service depot.

88 and 109.

The horn is adjusted on initial assembly and should not require attention for a considerable time. Adjustment merely takes up wear of moving parts and does not alter the pitch of the note; proceed as follows:—

1. Ascertain that the horn failure or faulty note is not due to some outside source, such as a discharged battery, loose connection, loose part adjacent to the horn, etc.

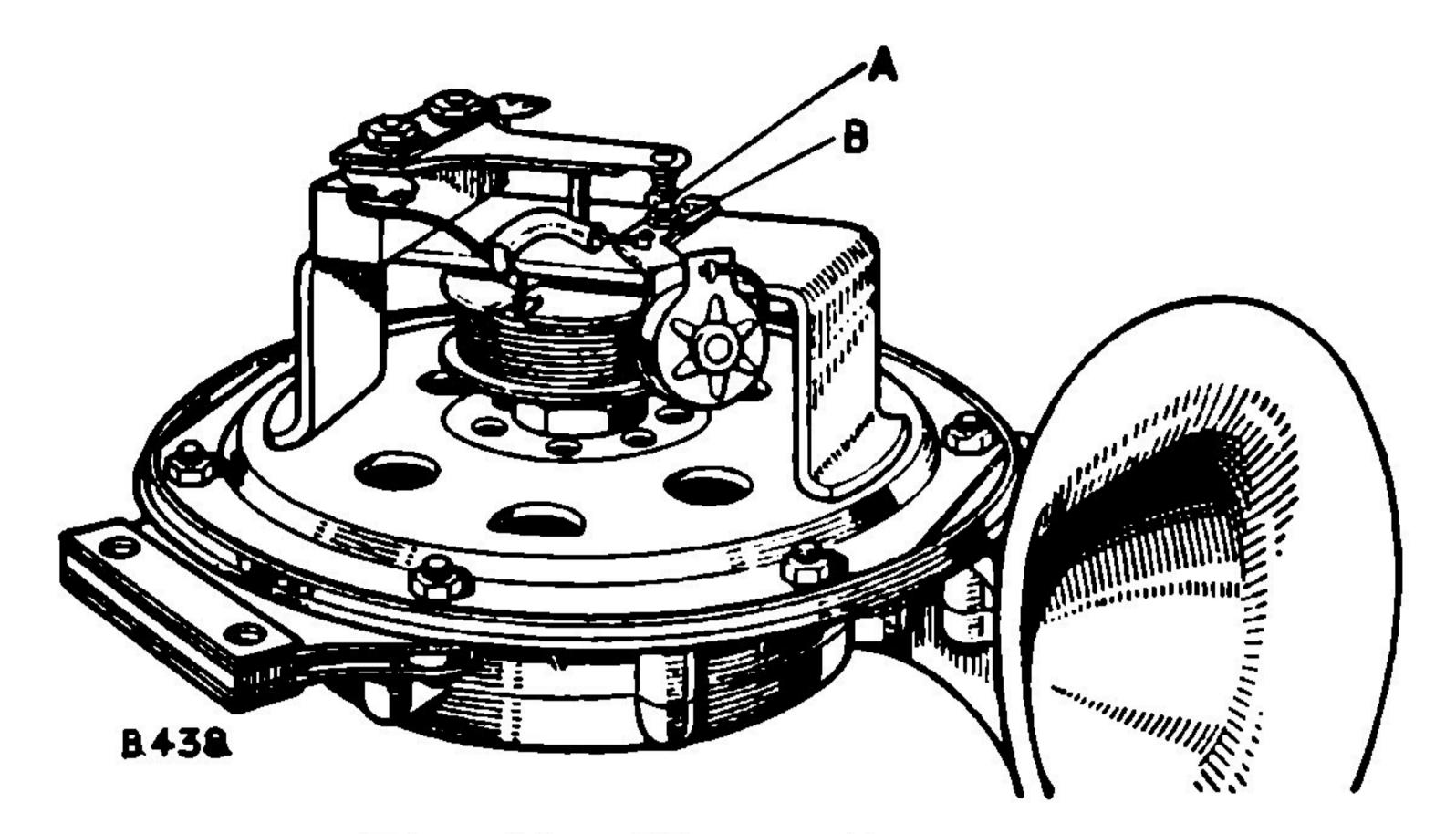


Fig. 44. Horn adjustment. A—Adjustable contact. B—Locknut.

- 2. Disconnect the supply lead from the horn, taking care that the end does not contact any metal part of the vehicle.
- 3. Remove the horn cover. Slacken the locknut on the fixed contact and rotate the adjusting nut until the contacts are just separated (indicated by the horn failing to sound, when the horn button is momentarily depressed).
- 4. Turn the nut half a revolution in the opposite direction and tighten the locknut.
- Replace the cover.
- 6. If the note is still unsatisfactory, the horn should be examined at a Service Depot.

REPLACEMENT BULBS.

Position	Make and Type	Voltage	Wattage
Headlamps (R.H.D. models)	Lucas No. 354	12	42/36 Double filament (dip to left)
Headlamps (L.H.D. models except North America and Europe)	Lucas No. 355	12	42/36 Double filament (dip to right)
Headlamps (Europe except France)	Lucas No. 370	12	45/40 Double filament (Duplo) (vertical dip)
Headlamps (France and North America)	Special	12	
Sidelamps	Lucas No. 222	12	4
Stop, tail lamps	Lucas No. 380	12	21/6 Double filament
Rear number plate lamp (North American vehicles)	Lucas No. 222	12	4
Instrument panel lights	Lucas No. 987	12	2.2 M.E.S.
Warning lights	Lucas No. 987	12	2.2 M.E.S.

HEADLAMP BULB REPLACEMENT.

Slacken the clamping bolt at the bottom of the headlamp rim and lift off the rim and dust-excluding rubber. Press in the light unit against the tension of the springs on the three adjustment screws, turn it anti-clockwise and withdraw. Twist the back shell in an anti-clockwise direction and pull it off the light unit; the bulb can then be replaced and the unit reassembled.

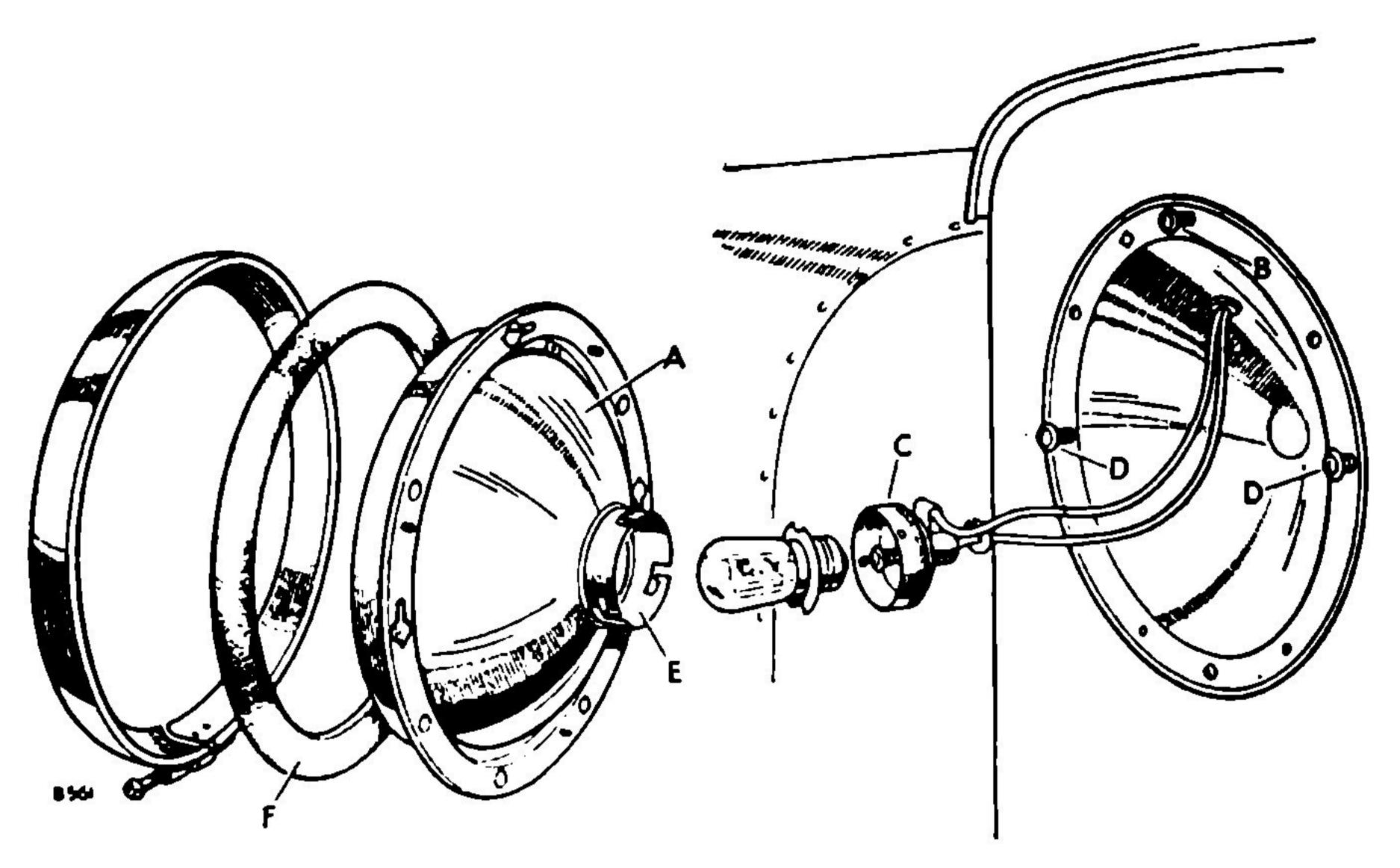


Fig. 45. Headlamp.

- A—Light unit.
- B—Vertical setting screw.
- C—Back shell.
- D—Horizontal setting screws.
- E—Bulb holder.
- F-Dust excluder.

HEADLAMP SETTING.

The headlamps should be set so that the main driving beams are parallel with the road surface. If adjustment is required, remove the rim as described above. The vertical setting can then be made by turning the screw at the top of the lamp and horizontal adjustment by means of the screws at the side of the unit.

In order to adjust headlamps, using a beam setting board, proceed as follows:—

- 1. Mark on the board the dimensions given in Fig. 46 and position the vehicle, unladen, on level ground.
- 2. Place the board 12 ft. (365,8 cm.) in front of the headlamps ensuring that it is at right angles to the vehicle centre line and that the centre line on the board is in the same plane as the vehicle centre line.

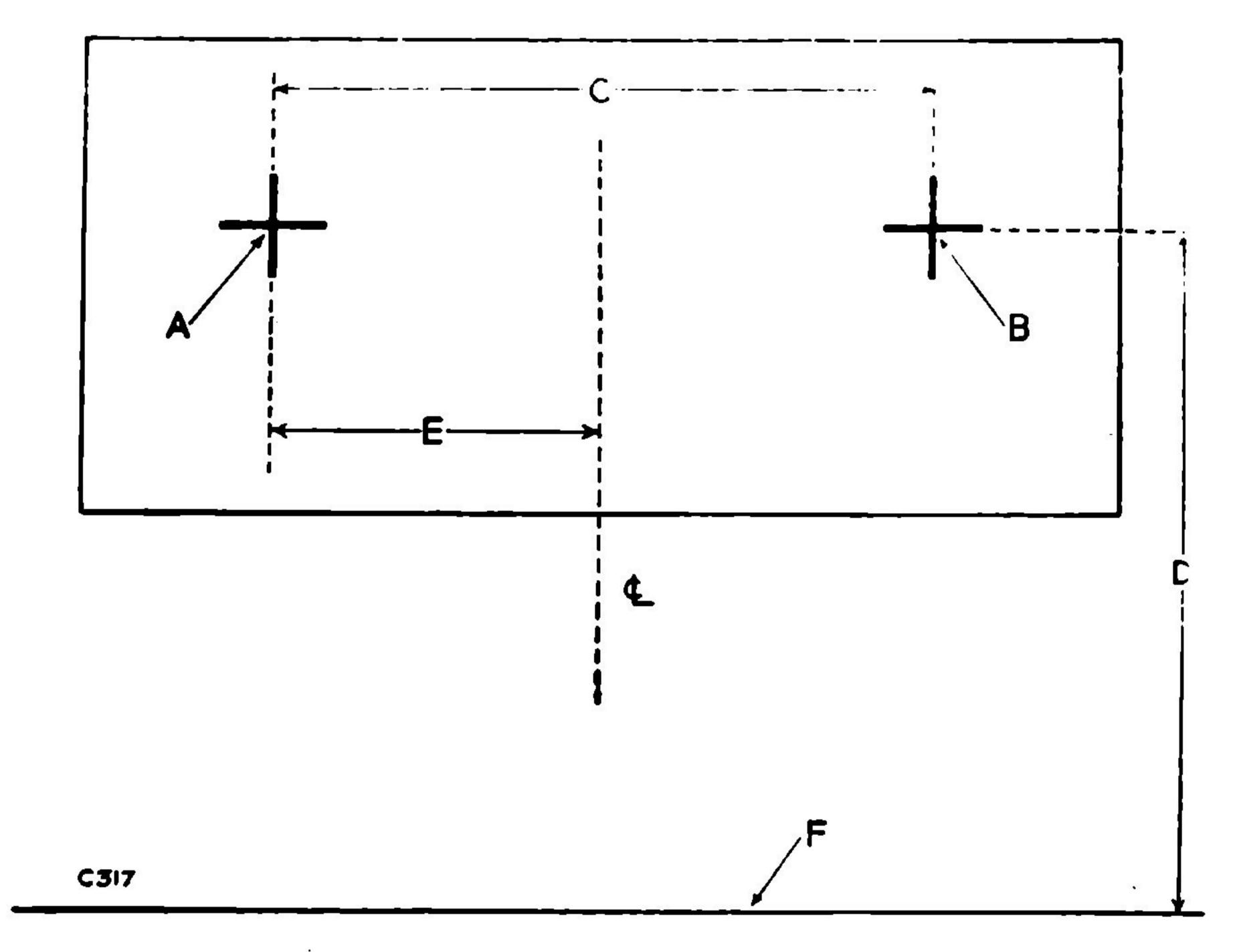
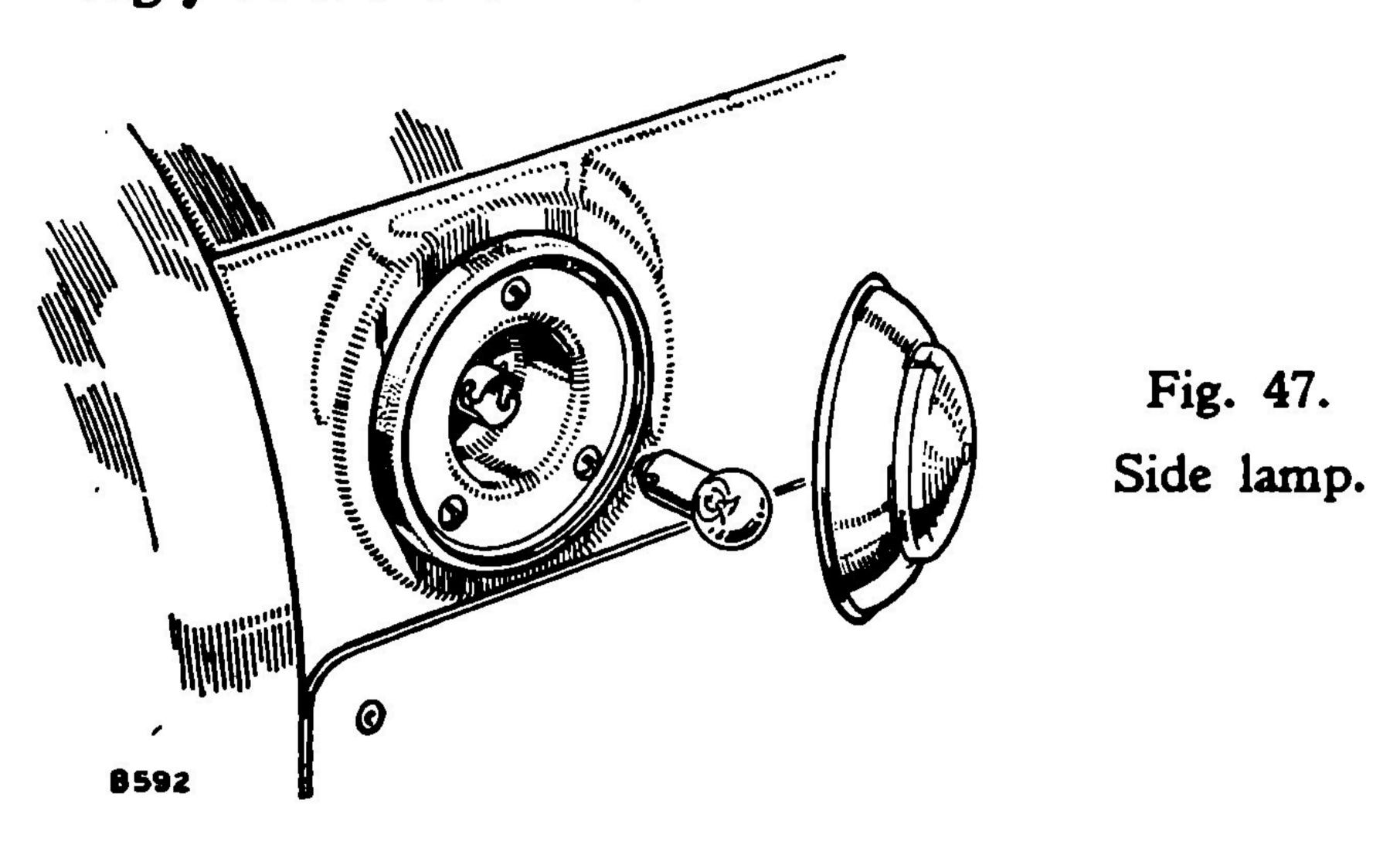


Fig. 46. Headlamp setting board dimensions.

- A—Concentrated area of light—L.H. headlamp. B—Concentrated area of light—R.H. headlamp.
- C-20 in. (508 mm.).
- D-35½ in. (901,7 mm.)-86 and 88 models. 37½ in. (952,5 mm.)—107 and 109 models.
- E—10 in. (254 mm.).
- F-Ground level.
- 3. Adjust the beam by turning the screws indicated in Fig. 45 until the area of concentrated light corresponds with the marks on the beam setting board.

SIDE LAMP BULB REPLACEMENT.

Lever the rubber bead away from the lamp and remove the rim and glass from the bottom first. Renew the bulb, move the rubber bead aside, locate the rim at the top of the lamp and press it into position; finally position the bead so that it fits snugly round the rim.



STOP, TAIL LAMP BULB REPLACEMENT.

Turn the bulb cover and glass complete, to the left approx. 50° and withdraw from bulb holder assembly. The double filament bulb is fitted with securing pegs arranged to ensure that bulb replacement is only possible with the stop lamp filament upward.

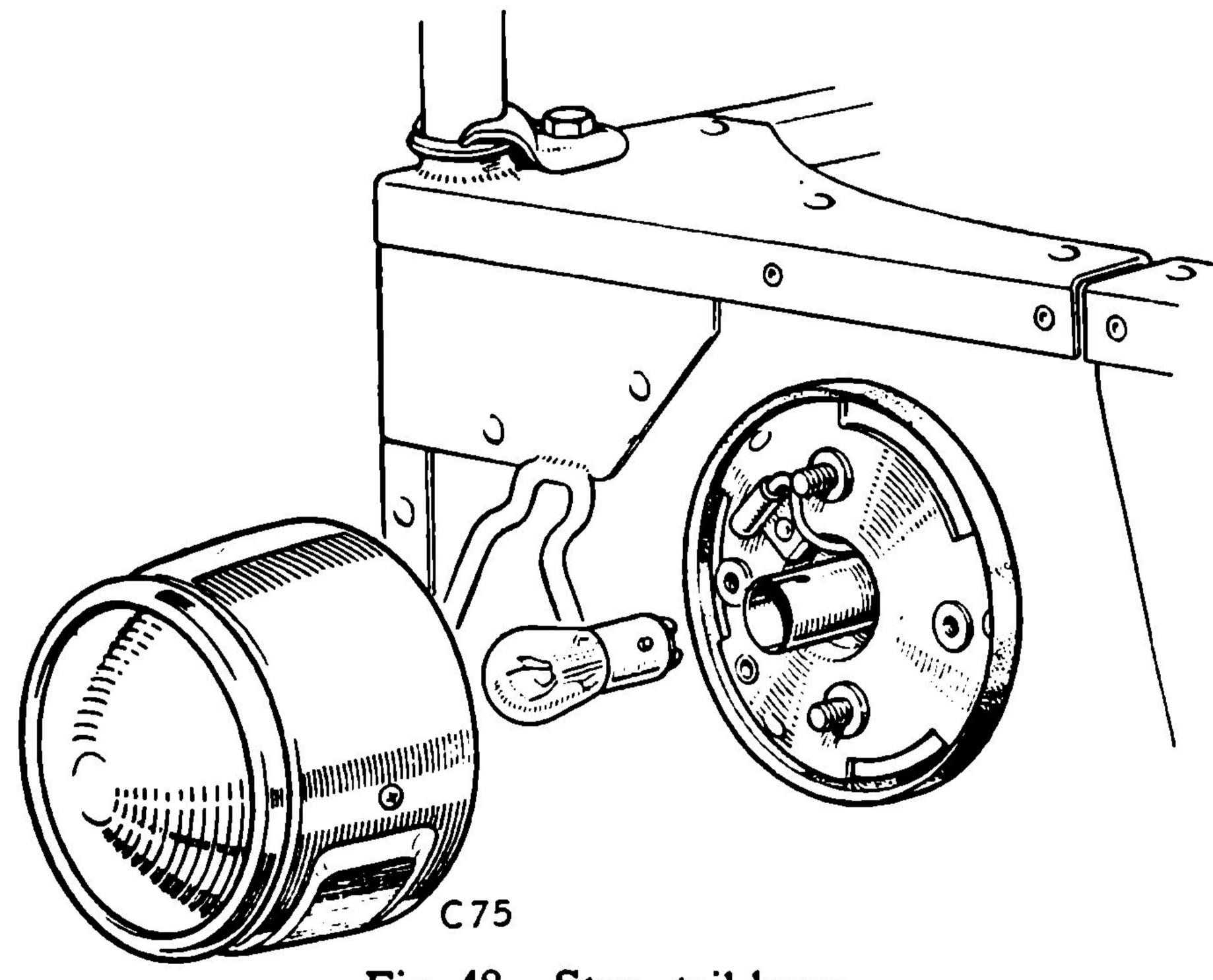


Fig. 48. Stop, tail lamp.

REAR NUMBER PLATE LAMP BULB REPLACEMENT (North American vehicles).

Slacken the securing screw and swing open the cover; the bulb is then accessible in the lamp body.

INSTRUMENT PANEL AND WARNING LIGHT BULB REPLACEMENT.

Should a warning light bulb burn out, operation of the corresponding component will not be affected, but it should be replaced at the earliest opportunity to safeguard that particular item of equipment.

The ignition, mixture control and oil pressure warning light bulbs can be renewed after unscrewing the respective bezels from the front of the instrument panel. Access to the instrument panel illumination and headlamp warning light bulbs is gained by withdrawing the instrument panel facia; this is effected by removing the five screws, washers and nuts securing the panel. See Fig. 3, Page E-8.

WINDSCREEN WIPER.

WINDSCREEN WIPER ARM AND BLADE REPLACEMENT.

Slacken the fixing nut and tap sharply to release the collet which clamps the arm on to the spindle; then remove the complete assembly.

When fitting the replacement arm and blade, slacken the securing nut and push the arm boss over the end of the spindle as far as it will go. Secure by tightening the nut.

WINDSCREEN WIPER BLADE REPLACEMENT.

Remove the rubber bush securing the old blade to the arm; insert the tongue on the replacement blade through the slot in the arm and secure it by fitting the rubber bush through the hole in the tongue.

BODYWORK

CLEANING BODY.

It is always preferable to clean the bodywork with water and sponge, using plenty of water; wherever possible the surface should be freely hosed. Dry with a chamois leather.

It is well periodically to wash the underside of the vehicle, to prevent the formation of mud pockets.

IN CASE OF TROUBLE:

LOCATION AND REMEDY OF FAULTS

Although every precaution is taken to eliminate all possible causes of trouble, failure may occasionally develop through lack of attention to the equipment, or damage to the wiring. The following pages set out the recommended procedure for a systematic examination to locate and remedy the causes of some of the more probable faults which may occur during the life of the vehicle.

All the checks listed can be readily carried out without special equipment; if the fault is not located in this way, consult the local Rover distributor or dealer, who will be able to investigate the defect more closely.

ENGINE FAILS TO START

- 1. Check that the ignition is switched ON. •
- 2. Check that there is sufficient petrol in the tank.
- 3. Check that the cold start control is set correctly for starting (see Page E-13).
- 4. Check that the engine is being turned at an adequate speed by the starter motor; this speed will be recognised after some experience with the vehicle.

If the cranking speed is too low:—

- (i) Check the battery connections for tightness and cleanliness.
- (ii) Check the state of charge of the battery by switching on the headlamps and pressing the starter button; if the headlamps go out or very dim when the starter is operated, the battery requires recharging from an independent electrical supply.

It should be possible to start the engine by cranking with the starting handle.

- 5. Remove the cable from each sparking plug terminal in turn and hold it so that the end is about \(\frac{1}{2}\) in. (7 mm.) away from some metal part of the chassis, while the engine is turned over; if sparks jump the gap regularly, the coil and distributor are functioning correctly.
 - (i) If the sparks are strong and regular, remove and clean the sparking plugs and reset the electrode gaps to .029 to .032 in. (0,75 to 0,80 mm.).
 - (ii) If the sparks are NOT regular:—
 - (a) Check that the distributor rotor is in position.
 - (b) Check that the L.T. connections on the coil and distributor are clean and tight.
 - (c) Check that the distributor points are:—
 - 1. Clean.
 - 2. Opening and closing correctly.
 - 3. Correctly set when open—gap .014 to .016 in. (0,35 to 0,40 mm.).
 - (d) Check that current is present at the SW terminal on the coil, by disconnecting the wire at the coil end and touching it against the SW terminal, with the ignition switch ON and the distributor contact-breaker points closed. If sparks occur, low tension current is flowing through the coil correctly; if there is NO spark, either the coil or the low tension wiring is defective and your dealer should be consulted.
 - (iii) If the sparks are weak and in addition there is a flashing at the distributor contact breaker points, a faulty distributor condenser is indicated.
 - (iv) If the sparks are present on some leads, but not on others, check the distributor cap for cracks and the plug leads for faulty insulation.

- 6. Disconnect the petrol pipe from the carburetter and check that petrol is delivered to the carburetter when the ignition is switched on. If petrol is not delivered from the pipe:—
 - (i) Check that the pump "ticks" when the ignition is on, with the pipe still disconnected. If not, the fault is probably in the pump wiring.
 - (ii) Check that the petrol pipes and filters are clear (see Page E-27).
 - (iii) Check that there are no air leaks in the suction line to the petrol pump (see Page E-28).

ENGINE STARTS BUT SOON STOPS

- 1. Check that the controls are set correctly (see Page E-13).
- 2. Check the petrol feed to the carburetter by disconnecting the pipe from the carburetter and noting the petrol flow with the ignition switched on.

If there is little or no flow:—

- (i) Check the petrol level in the tank.
- (ii) Check that the air vent in the filler neck is clear.
- (iii) Check the petrol pump for correct operation (see Page E-27).
- (iv) Check that the petrol filters are clear (see Pages E-27 and E-29).
- (v) Check that the petrol pipes are clear (see Page E-27).
- 3. Check that the carburetter jets are clear, in the following order (Page E-29):—
 - (i) Starter petrol jet.
 - (ii) Main jet.
 - (iii) Pilot jet.
- 4. Check for a fault in the ignition circuit by connecting a wire between the "A" connection on the voltage control box and the "SW" connection on the coil, thus by-passing the ignition switch. At the same time, the wire from the ignition switch must be disconnected from the coil.
- 5. Remove the carburetter top cover and check that there is no water in the float chamber.

ENGINE MISFIRES

Engine running on less than four cylinders, either intermittently or continually.

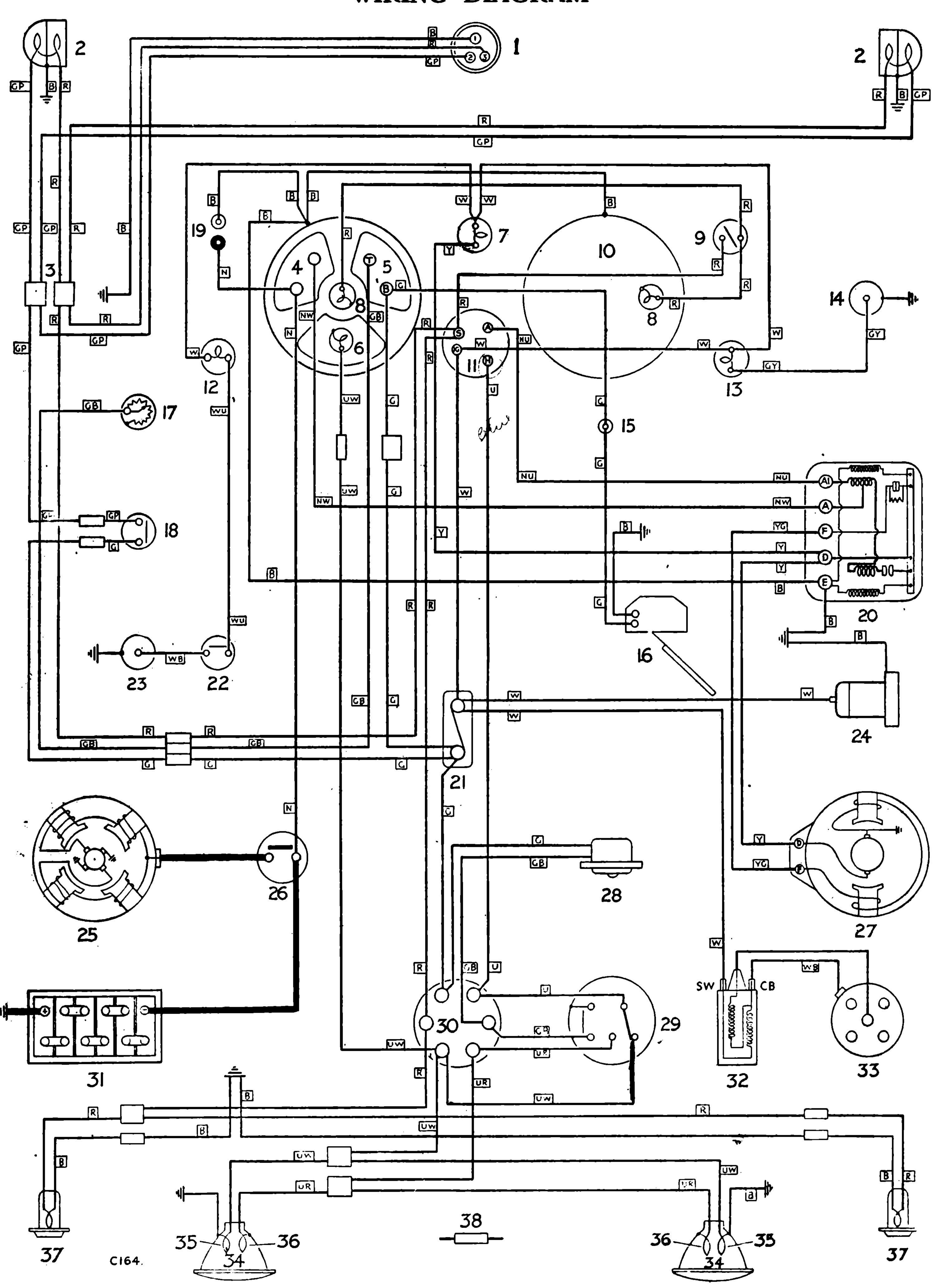
- 1. Stop the engine and endeavour to re-start with the starter motor to check the state of the battery and connections. If the battery is in a low state of charge, it will need recharging from an independent electrical supply, and the charging circuit should be checked as directed under CHARGING CIRCUIT below.
- 2. Remove the lead from each sparking plug in turn and check:—
 - (i) By holding the end of the lead about 4 in. (7 mm.) away from a metal part of the engine with the engine running. Sparks should jump the gap regularly.

If NO SPARK is present on one or more cylinders:—

- (a) Check for moisture on the H.T. leads or distributor.
- (b) Check, clean and reset the distributor contactbreaker points to .014 to .016 in. (0,35 to 0,40 mm.) as necessary.
- (c) Check the distributor cap for cracks and the plug leads for faulty insulation.

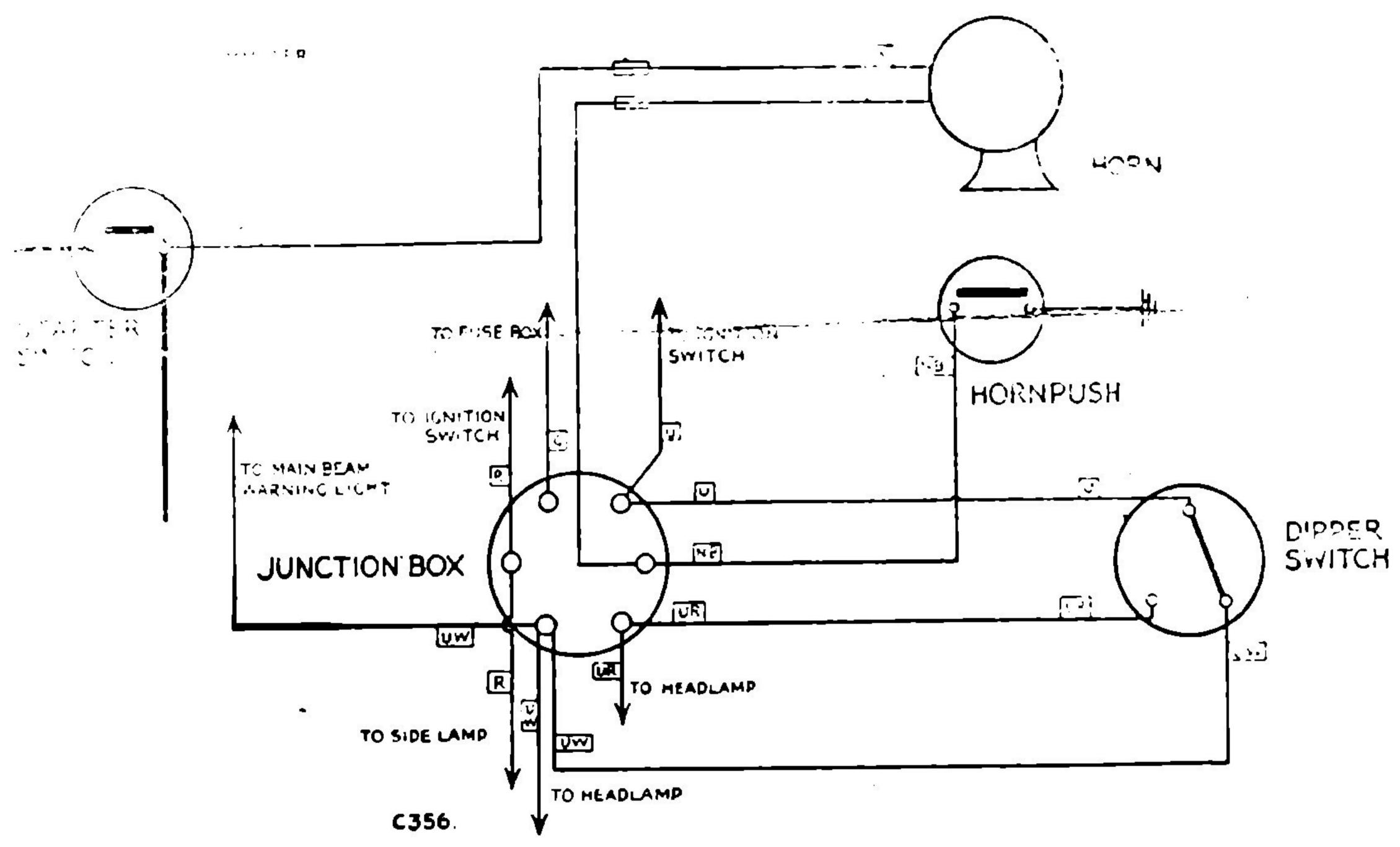
(Continued on Page E-40)

WIRING DIAGRAM



The 88 and 109 wiring system is basically the same as the 86 and 107, differences are shown on the following page

WIRING DIAGRAM 86 and 107



WIRING DIAGRAM 88 and 109 (See also diagram on previous page).

KEY TO WIRING DIAGRAM

- 1. Trailer light socket (extra equipment)
- 2. Stop, tail lamps
- 3. Snap connectors for trailer light
- 4. Ammeter
- 5. Petrol level gauge
- 6. Headlamp main beam warning light
- 7. Ignition warning light
- 8. Panel lights
- 9. Panel light switch
- 10. Speedometer
- 13. Oil pressure warning light
- 11. Ignition and lighting switch
- 12. Mixture control warning light

- 14. Oil pressure switch
- 15. Windscreen wiper plug and socket 16. Windscreen wiper
- 17. Petrol tank level unit
- 18. Stop lamp switch
- 19. Inspection lamp sockets 20. R.B.106 voltage control box
- 21. S.F.5 fuse box (35 amp. fuse)
- 22. Mixture control switch (at control)
- 23. Mixture control thermostat switch (at cylinder head)
- 24. Petrol pump
- 25. Starter

- 26. Starter solenoid switch
- 27. Dynamo
- 28. Horn
- 29. Horn push and headlamp dipper switch
- 30. Junction box
- 31. 12 volt battery (positive earth)
- 32. Ignition coil
- 33. Distributor
- 34. Headlamps
- 35. Main beam 36. Dip beam
- 37. Side lamps
- 38. Snap connectors shown thus _______

NOTE. On vehicles to the North American specification, the connections at the ignition and lighting switch are such that the sidelamps are extinguished when the headlamps are in use.

CABLE COLOURS KEY TO

B—BLACK G-GREEN

claims put forward under the terms of the Company's guarantee.

N-BROWN P—PURPLE

R—RED U-BLUE RN-RED WITH BROWN AND SO ON W-WHITE Y-YELLOW

RECOMMENDED LUBRICANTS

- The Rover Company attaches very great importance to the nature of the lubricants used in its products and therefore maintains tests of those which it recommends.

Because of the extensive nature of these tests they cannot be carried out upon more than a strictly limited number of different makes. Consequently the Rover Company currently confines its recommendations to those set out below.

Should for any reason such lubricants not be available in certain overseas territories, the Rover Distributor or Dealer for that territory will obtain specific guidance from the Rover Company, or owners may communicate with the Company where they so wish. The attention of owners is drawn to the fact that the use of lubricants, other than those recommended, could in certain circumstances affect the settlement o

COMPONENTS			WAKEFIELD				MOBIL		
		S.A.E.	Agricultural	Car	Agricultural	Car	Agricultural	Саг	
ENGINE, AIR CLEANER	Extreme Winter (below -20°F)	S.A.E.5W	Agricastrol ZZ	Castrol ZZ		Energol S.A.E.5W			
	Extreme Winter (10°F to -20°F)	S.A.E.10W	Agricastrol Z	Castrol Z	<u> </u>	Energol S.A.E.10W		Mobilail 10W	
•	Winter (10°F to 32°F)	S.A.E.20W	Agricastrol Light	Castrolite	Energol Tractor Oil 20		Mobiland 620	Mobiloil Arctic	
	Summer (32°F to 90°F)	S.A.E.30	Agricastrol Medium	Castrol XL	Energol Tractor Oil 30		Mobiland 630 Tractor Oil	Mobiloil A	
	Tropical (above 90°F)	S.A.E.40	Agricastrol Medium Heavy	Castrol XXL	Energol Tractor Oil 40	Energol S.A.E.40		Mobiloil AF	
UPPER CYLINDER	LUBRICANT		Castrollo	Castrollo	Energol U.C.L.	Energol U.C.L.	Mobil Upperlube	Mobil Upperlube	
GEARBOX AND TRANSFER BOX	Normal (above 32°F)	S.A.E.50	Agricastrol	CastroTXXL '	Energal Tractor Oil 50	Energol S.A.E.90	Mobiland 650 Tractor Oil	Mobiloil	
I RANSI'LK DOA	Winter (32°F to 10°F)	S.A.E.80	Agricastrol Medium	Castrol XL	Energol Tractor Oil 30	Energol S.A.E.SO	. —-	Mobilube C80	
	Extreme Winter (below 10°F)	S.A.E.20	Agricastrol	Castrolite	Energol Tractor Oil 20			Mobiloil Arctic	
DIFFERENTIALS AND SWIVEL	Normal (above 0°F)	S.A.E.90EP	Agricastrol Gear Oil EP90	Castrol Hi-press 140EP	Energol Tractor Gear Oil EP90		Mobiland EP Gear Tractor Oil	Mobilube GX90	
PIN HOTT, 355	Will: (below 0°F)	S.A.E.80EP		Castrol Hypoy 80		Energol EP S.A.E.80	—	Mobilube GX80	
STERING BOX	Normal (above 32°F)	S.A.E.140	Agricastrol Gear Oil Medium	Castrol D	Energol Tractor Gear Oil 140	Energol S.A.E.140	Mobiland Gear 140 Tractor Oil	Mobilube C140	
LUB RICATION NIPPLES	Winter (32°F to 0°F)	S.A.E.90	Agricastrol Gear	Castrol ST90	— Geal Off 140	Energol S.A.E.90	' —	Mobilube C90	
14111	Extreme Winter (below 0°F)	S.A.E.80	Oil Light	Castrol ST80	 -	Energol S.A.E.80	T	Mobilube C80	
STEERING RELAY	UNIT (SEALED)	S.A.E.140	Agricastrol Gear Oil Medium	Castrol D	Energol Tractor Gear Oil 140		Mobiland Gear 140 Tractor Oil	Mobilube C140	
REAR POWER TAK AND CAPSTAN W	CE-OFF, PULLEY UNIT	S.A.E.20W	Agricastrol Light	Castrolite	Energol Tractor Oil 20	Energol S.A.E.20W	Mobiland 620 Tractor Oil	Mobiloil Arctic	

NOTE 1: $-20^{\circ}F = -28^{\circ}C$: $0^{\circ}F = -17^{\circ}C$; $10^{\circ}F = -12^{\circ}C$; $32^{\circ}F = 0^{\circ}C$; $90^{\circ}F = 32^{\circ}C$.

[.] NO lubricants of other MAKES, GRADES OR TYPES are currently recommended. (See also paragraph 3 under Recommended Lubricants above.)

If the SPARK is IRREGULAR on all cylinders:—

- (a) Check for moisture as in (i) (a).
- (b) Check the distributor points as in (i) (b).
- (c) Check the cap and leads as in (i) (c).
- (d) Check the L.T. connections for tightness and cleanliness.
- (e) Check for flashing or "blueing" of the contactbreaker points. If present, the distributor condenser should be renewed.
- (f) Check for a fault in the ignition circuit by connecting a wire between the "A" connection on the voltage regulator box and the "SW" connection on the coil, thus by-passing the ignition switch. At the same time, the wire from the ignition switch must be disconnected from the coil.
- (ii) For any audible alteration in the running of the engine, as each lead is removed. No alteration will indicate that the sparking plug in question is at fault:—
 - (a) Remove and clean the plug; reset the gap to .029 to .032 in. (0,75 to 0,80 mm.) as necessary.
 - (b) If still faulty, fit a new sparking plug.
- 3. If the "missing" is accompanied by "spitting back" through the carburetter, a valve may be sticking. This can often be cured by slowly dropping oil or upper cylinder lubricant into the carburetter intake, while the engine is running.

LACK OF ENGINE POWER

- 1. Check that the carburetter throttle is opening fully.
- 2. Check that the brakes are not binding and that the tyre pressures are correct.
- 3. Check that the carburetter jets are not blocked (in the following order). See Page E-29:—
 - (i) Main jet.
 - (ii) Pump jet.
 - (iii) Economy jet.
- 4. Check the ignition timing.
- 5. Check the tappet adjustment.
- 6. If items 1—5 are satisfactory, it is probable that the engine needs decarbonising, and your Rover distributor or dealer should be consulted.

CHARGING CIRCUIT

- 1. Battery in low state of charge.
 - (a) This state will be shown by lack of power when starting, poor light from the lamps and hydrometer readings below 1.200, and may be due to the dynamo either not charging or giving low or intermittent output. Check the ammeter reading when the vehicle is running steadily in top gear with no lights in use; a definite steady charge should be indicated. The ignition warning light will not go out if the dynamo fails to charge, or will flicker on and off in the event of intermittent output.
 - (b) Examine the charging and field circuit wiring, tightening any loose connections, or replacing broken cables.

Pay particular attention to the battery connections.

- (c) Examine the fan and dynamo driving belt; take up any undue slackness by turning the dynamo on its mounting (see Page E-29).
- (d) If the cause of the trouble is not apparent, have the equipment examined at a service depot.

2. Battery overcharge.

This will be indicated by need for topping-up of the readings. Check the ammer running steadily—with a fully lights or accessories in use, the confidence of the order of only 3—4 amperes. It is adversal to resetting tested and adjusted if new depot.

STARTER MOTOR

- 1. Starter motor lacks power or fails to turn engine.
 - (a) See if the engine can be turned over by hand. If not, the cause of the stiffness of the engine must be located and remedied.
 - (b) If the engine can be turned by hand, check that the trouble is not due to a discharged battery.
 - (c) Examine the connections to battery, starter and starter switch, making sure that they are tight and that the cables connecting these units are not damaged.
 - (d) It is also possible that the starter pinion may have jammed in mesh with the flywheel, although this is by no means a common occurrence. To disengage the pinion, pull off the dust cap and rotate the squared end of the starter shaft by means of a spanner.
- 2. Starter operates, but does not crank engine.

This fault will occur if the pinion of the starter drive is not allowed to move along the screwed sleeve into engagement with the flywheel, due to dirt having collected on the screwed sleeve. Clean the sleeve carefully with paraffin.

3. Starter pinion will not disengage from flywheel when engine is running.

Stop the engine and ascertain if the starter pinion is jammed in mesh with the flywheel. Release it, if necessary, by withdrawing the dust cap and rotating the squared end of the starter shaft in the opposite direction to normal rotation. If the pinion persists in sticking in mesh, have the equipment examined at a service depot. Serious damage may result to the starter if it is driven by the flywheel.

LIGHTING CIRCUITS

- 1. Lamps give insufficient illumination.
 - (a) Test the state of charge of the battery, recharging it if necessary either by a long period of day-time running or from an independent electrical supply.
 - (b) Check the setting of the headlamps (see Page E-35).
 - (c) If the bulbs are discoloured as a result of long service, they should be renewed. On lamps in which the reflector surface is accessible, see that it is clean.
- 2. Lamps light when switched on, but gradually fade out.

As para. 1 (a).

- 3. Brilliance varies with speed of velicle.
 - (a) As para. 1 (a).
 - (b) Examine the battery connections, making sure that they are tight; replace faulty cables.
- 4. Lights flicker.

Examine the circuits of the lamps for loose connections.

- 5. Failure of lights.
 - (a) As para. 1 (a).
 - (b) Examine the wiring for a loose or broken connection and remedy.

SECTION C

EXTRA EQUIPMENT

SOFT HOOD (Except Land-Rover 107 and 109).

The soft hood completely encloses the vehicle and can be opened at the rear to facilitate loading. It is available with plain sides or, for Export territories only, with side windows.

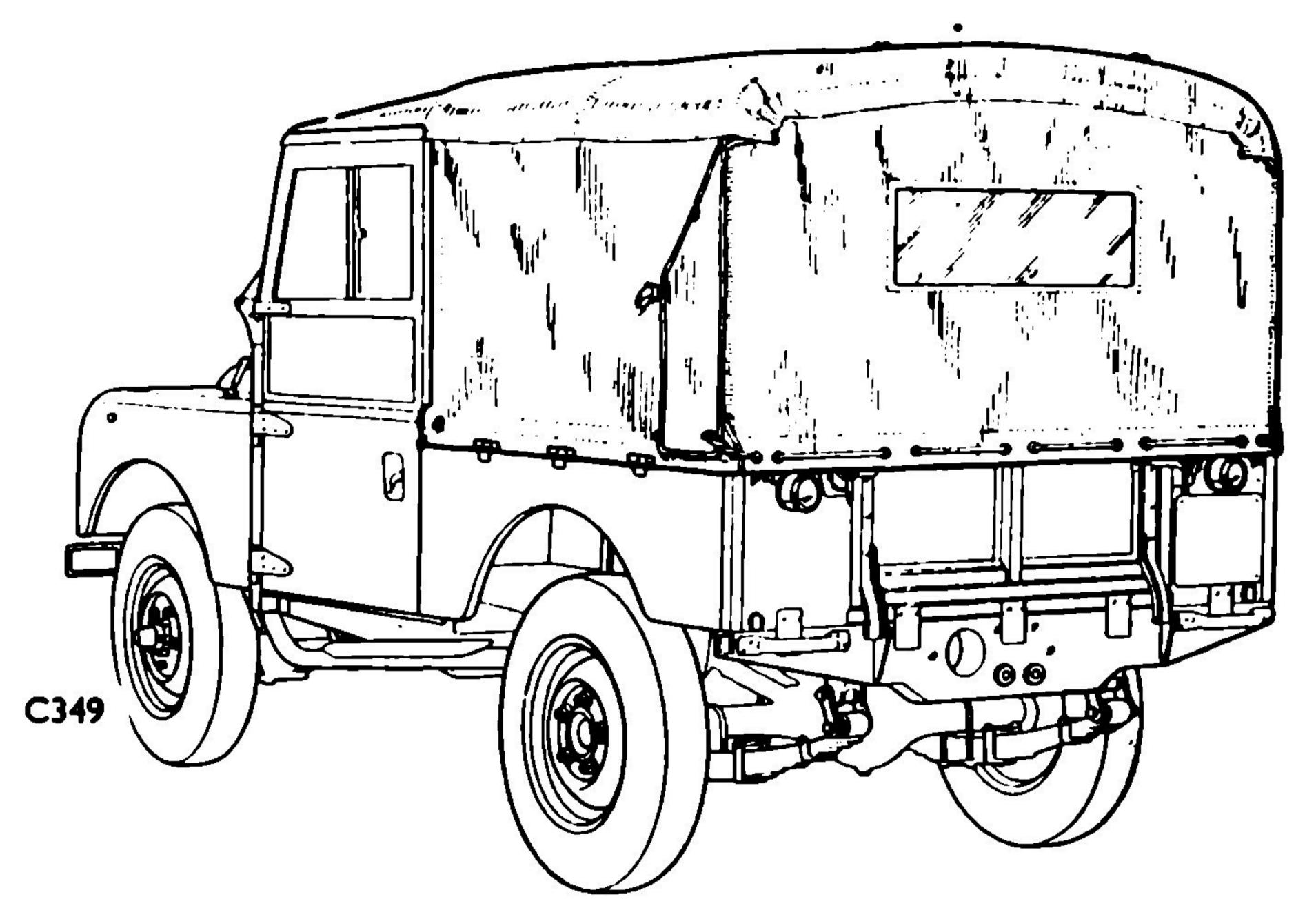


Fig. 49. Land-Rover 86 and 88 soft hood.

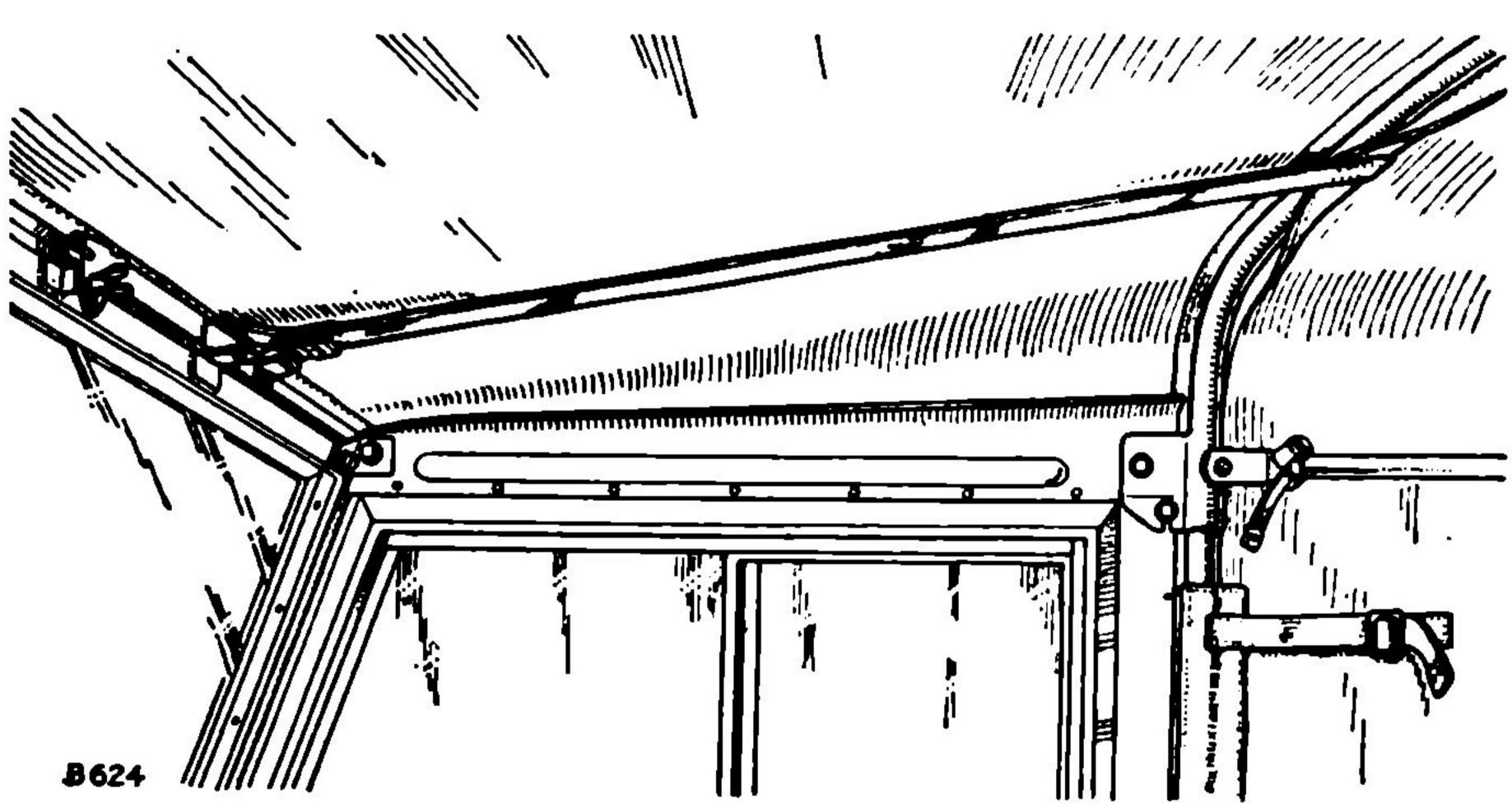


Fig. 50. Soft hood, front interior.

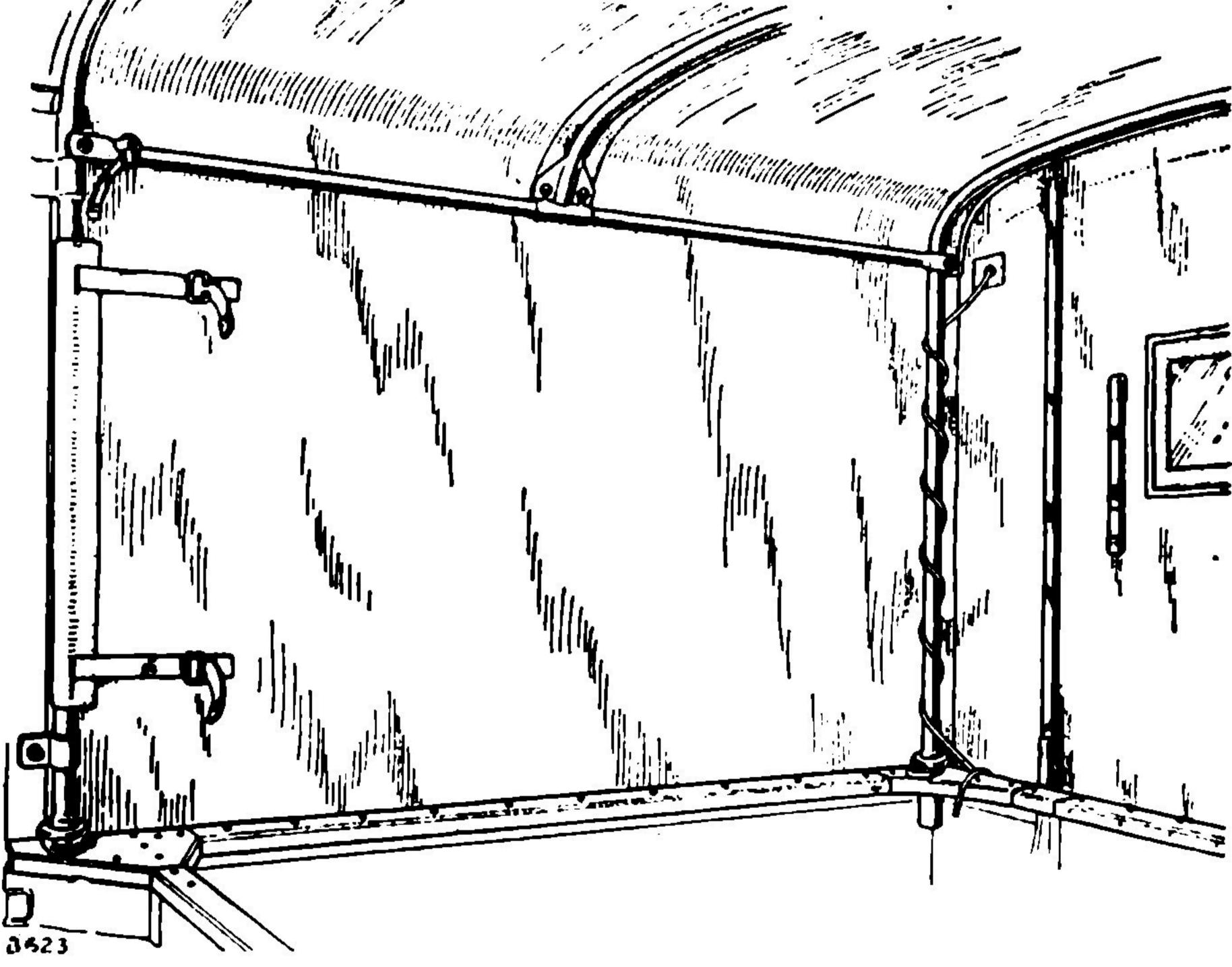


Fig. 51. Soft hood, rear interior.

Should the hood and hood sticks have been removed at any time, they may be re-fitted in the following sequence (see Figs. 50 and 51):—

1. Fit the two hood sticks in the sockets at the corners of the rear body and secure with clamp arms, bolts, washers and nuts.

- 2. Secure the tie tubes between the sticks by means of four self-locking nuts.
- 3. Fit the intermediate hood stick between the tie tubes, securing it with locknuts.
- 4. Secure the door top drain channels between the windscreen and front hood stick with bolts, plain washers and self-locking nuts.
- 5. If not already fitted, secure the door rear drain channels to the front hood stick with bolts, plain washers and self-locking nuts.
- 6. Place the hood over the sticks and secure it to the windscreen top rail.
- 7. Secure the front support straps to the support stays at the top of the windscreen.
- 8. Secure the rear hood straps to the staples on the body and the side curtain straps to the front hood stick.
- 9. Pass the side ropes round the hooks at the front corners of the body, secure under the side hooks and, together with the rear ropes, which have been previously laced round the rear hood stick, to the hooks at the rear of the body.
- 10. Push the rear curtain side flaps through the side pockets and secure.

If it is desired to raise the rear curtain, release the side flaps and the curtain bottom rope. Fold in the flaps and roll the curtain into three folds; secure by means of the short straps sewn inside the curtain.

REAR HOOD (Land-Rover 107 and 109).

A soft hood (Fig. 52) is available to enclose the rear body of the 107 and 109; it can be supplied with plain sides or, for Export territories only, with side windows. The method of fitting is very similar to that of the Land-Rover 86 and 88 except as below:—

Early models. The front panel is hooked under the front body capping and strapped at the sides to the front hood stick.

Late models. The front of the hood is fitted in retainers on the cab and secured in position by means of straps throught slots in the retainers. A rubber seal is fitted between the rear body and the cab to prevent ingress of dust.

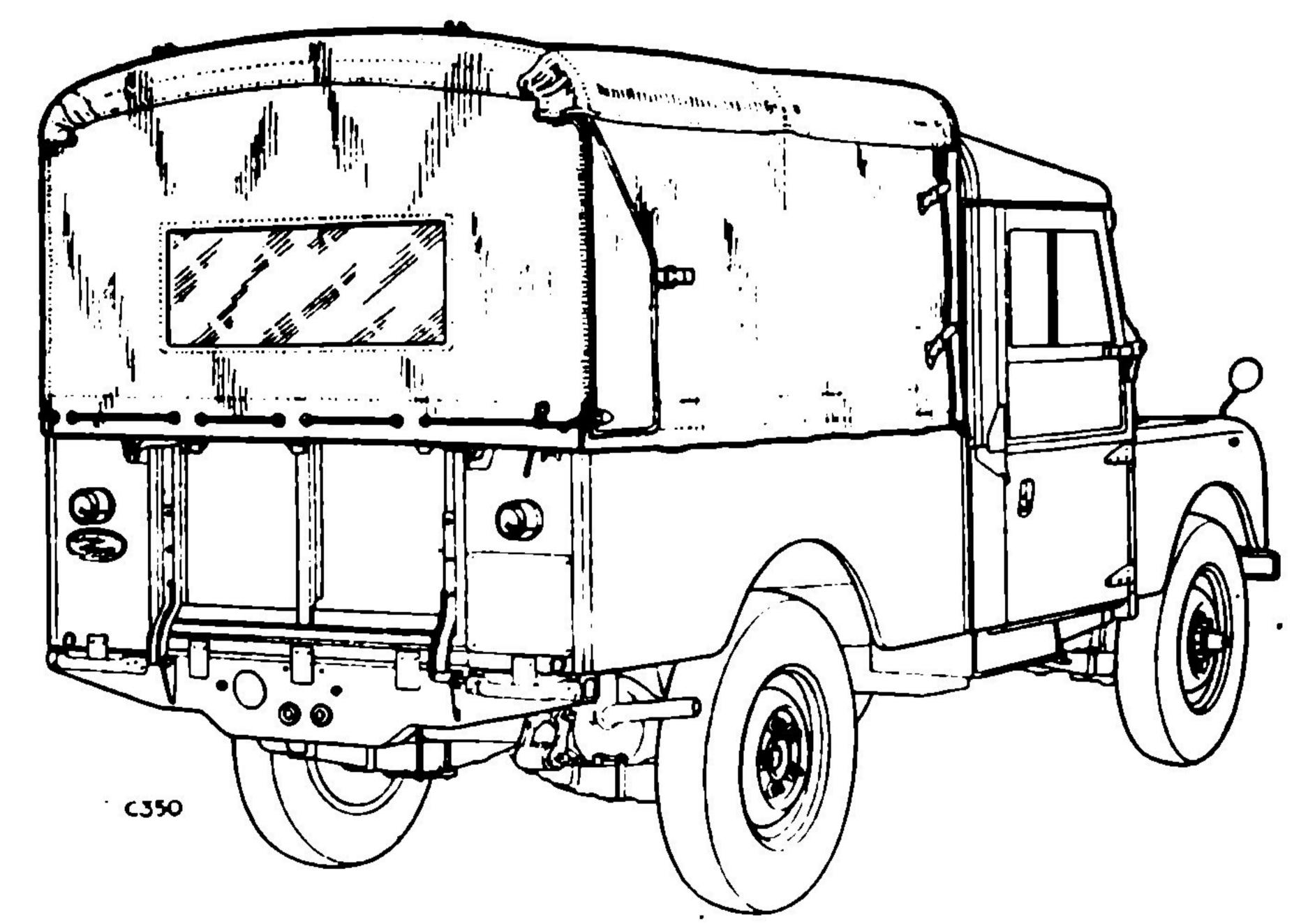


Fig. 52. Land-Rover 107 and 109 soft hood.

REAR COVER (Land-Rover 107 and 109).

This canvas cover encloses the rear body of the 107 and is used without hood sticks; it is secured by ropes under the hooks on the sides of the body.

HARD TOP (86 and 88).

The light alloy hard top is interchangeable with the soft hood and incorporates a rear door to facilitate loading.

It is available with plain sides or, for Export territories only, with side windows.

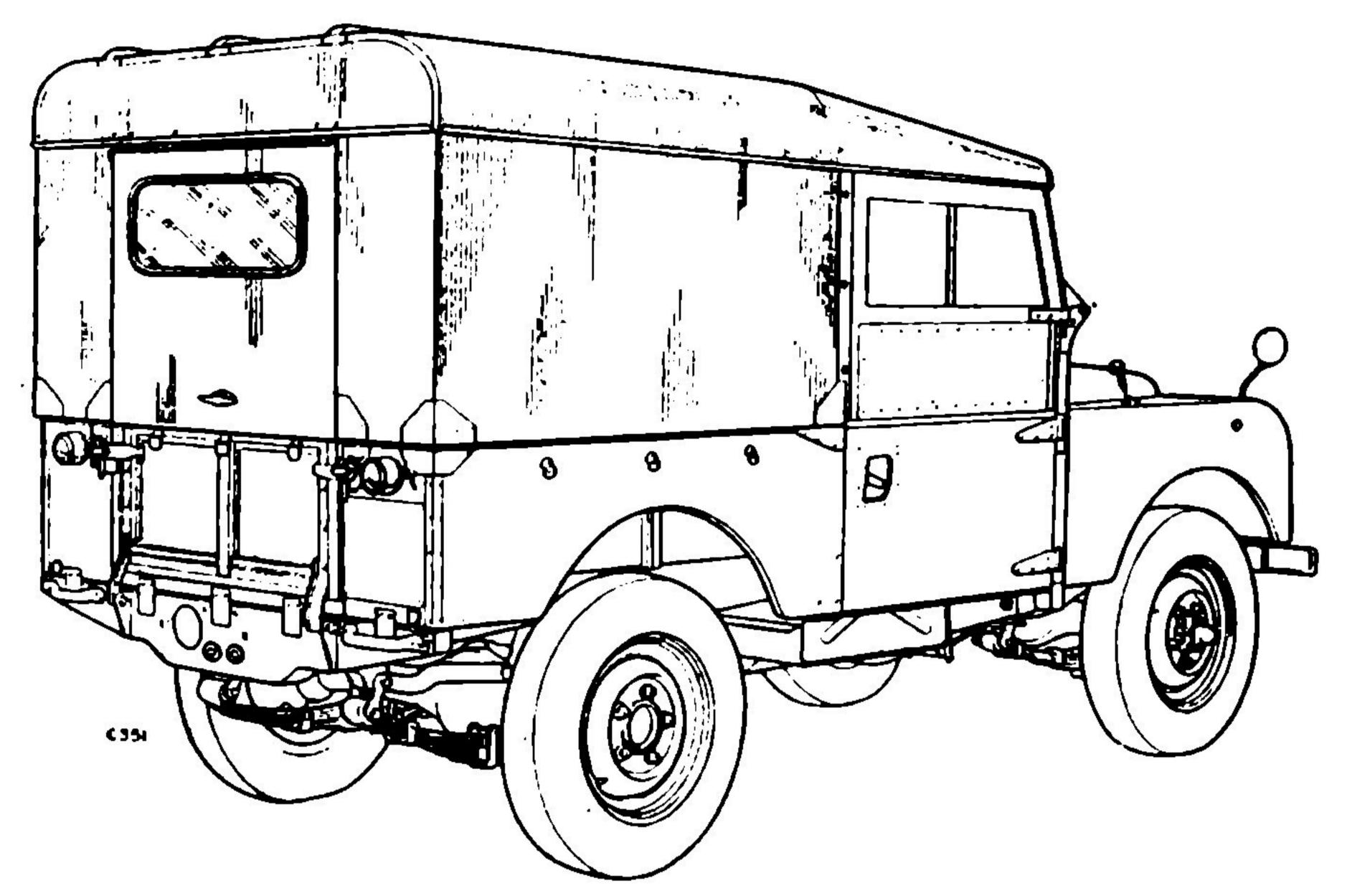


Fig. 53. Land-Rover 86 and 88 hard top.

Fitting procedure is as follows:—

- 1. Secure the side panels and rear door to the roof panel, using the fixings provided; leave the rear door fixings slack.
- 2. Place the hard top in position on the vehicle and secure through the hood stick sockets with the studs, washers and nuts provided; leave the nuts slack.
- 3. Secure to the capping corner brackets, adjacent to the tailboard, with the bolts, washers and nuts provided; leave the nuts slack.
- 4. Attach the roof panel to the windscreen with the fixings provided; leave the nuts slack.
- 5. Ensure that the rear door opens and locks correctly and then tighten all fixings, ensuring that the unit is pulled hard down on to the sealing rubbers.

STATION WAGON (86 and 88).

The Land-Rover 86 and 88 Station Wagon is a modified version of the basic model, having the original rear body to which sides with windows are secured and a hard top roof, complete with tropical panel, roof lights and ventilators, mounted, then secured at the windscreen and side panels.

The tailboard is not required, a full door being fitted in the rear end and a folding step secured to the rear cross-member to facilitate entry to and exit from the rear compartment.

Four folding seats are fitted to the wheelarch boxes in the rear, and a ribbed rubber mat covers the floor.

Front doors, toe-boards and scuttle are trimmed and a main front floor covering is held in position by carpet clips.

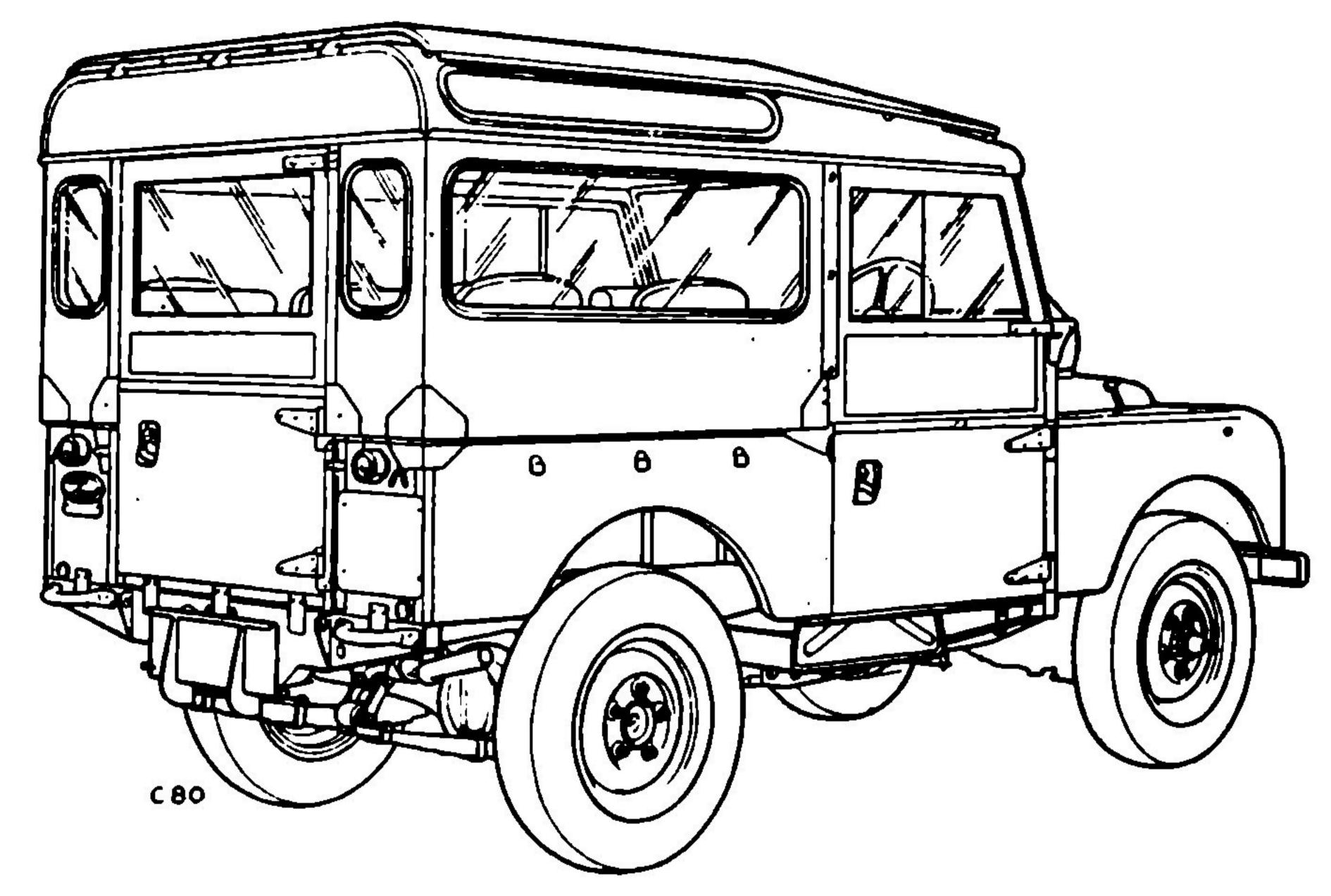


Fig. 54. Land-Rover 86 and 88 Station Wagon.

Private locks are fitted to the front R.H. door and rear door. A locking catch secures the L.H. front door from inside. Sliding windows are also fitted with locking attachments.

STATION WAGON (107).

The 10-seater Land-Rover 107 Station Wagon is mounted on a modified 107 chassis frame.

The seating arrangement provides accommodation for three people in the front, three on the back seat and four facing inwards on the seats fitted to the rear wheelarch boxes.

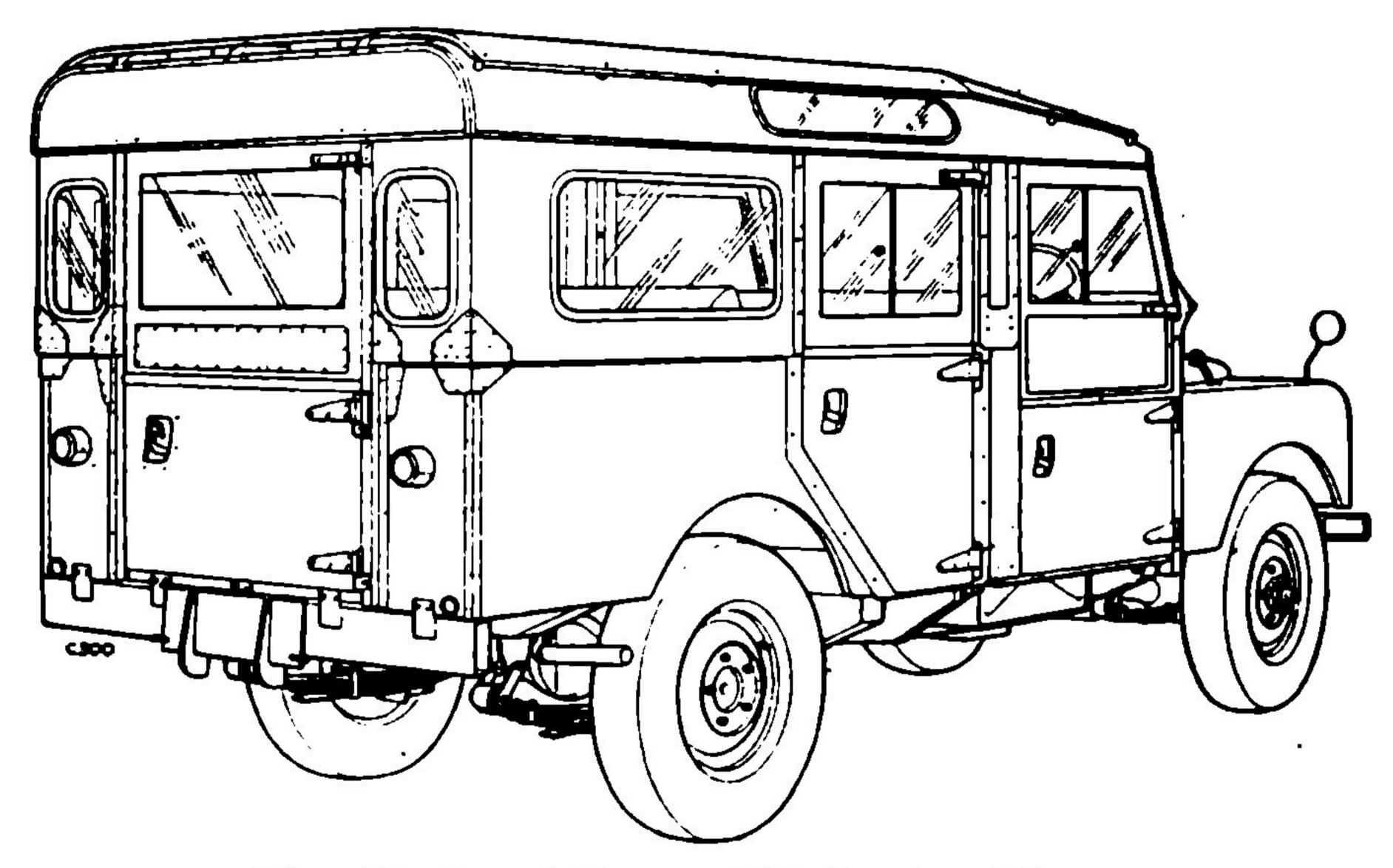


Fig. 55. Land-Rover 107 Station Wagon.

Wide doors immediately behind the normal front doors give access to the rear seats, while a door fitted in the rear end and a folding step secured to the rear cross member, facilitates entry to the rear compartment and to the side seats.

If the wheelarch seats are removed and the back seat folded forward the whole of the body is available for load carrying. Alternatively, the back seat squab can be folded backwards, and the front seat cushions and squab redisposed to form a comfortable bed.

All side doors, toe boards and scuttle are trimmed, and a main front floor covering is held in position by carpet clips.

A rubber mat covers the floor between front and back seats.

Private locks are fitted to the R.H. doors and rear door. A locking catch secures the L.H. doors from the inside, the sliding windows are also fitted with locking attachments.

TRUCK CAB.

The light alloy truck cab, fitted as standard on the Land-Rover 107, encloses the driving compartment only; it is also available for the Land-Rover 86 and 88. With a truck cab fitted on the 86 and 88, the spare wheel must be carried on the bonnet (see below).

Fitting procedure is as follows:—

- 1. Secure the rear panel to the roof panel, using the fixings provided.
- 2. Place the cab in position on the vehicle and secure to the seat backrest panel with the studs, washers and nuts provided; leave the nuts slack.
- 3. Attach the roof panel to the windscreen with the fixings provided; leave the nuts slack.
- 4. Secure the support angles at the bottom of the rear panel to the body capping, using the fixings provided.
- 5. Tighten all fixings, ensuring that the cab is pulled hard down on to the sealing rubbers.
- 6. Adjust the seals at the bottom of the rear panel and tighten the securing bolts and nuts.

DE LUXE TRIM FOR TRUCK CAB.

The truck cab is available fully or partially trimmed. A fully trimmed cab has a roof lining, dash top trim panels, glove box trim panels, scuttle and floor covering, rear and rear quarter trim panels, squab type backrest, one-piece door trim panels, private locks, window catches and a roof lamp fitted.

TROPICAL ROOF PANELS FOR HARD TOP AND CAB.

For hot climates, a tropical roof panel can be supplied for the hard top or truck cab. This panel is an additional skin fitted to the outside of the stiffeners on the roof panel. The air pocket so formed between the two panels acts as an insulator against the sun's rays; in addition, the air flow created between the panels helps to carry away the heat absorbed by the tropical panel.

In cases where a tropical roof panel is ordered separately, all necessary fixings are also supplied.

REAR SEATS (86 and 88).

Rear seats are available, each seat accommodating two persons.

The seat frames and back rests are bolted to the body cappings and wheel arches and the detachable cushions can be hinged up when not in use, to provide maximum carrying space.

REAR SEATS (107 and 109).

Either two or four rear seat units, each accommodating two persons, may be fitted in the Land-Rover 107 and 109. They are identical in design to those available for the standard vehicle.

RUBBER PEDAL PADS.

Rubber pads can be supplied for the brake and clutch pedals; they are not advised if the vehicle is operating under almost continuous wet or muddy conditions, owing to the danger of the feet slipping off the pedals.

FLASHING INDICATOR LAMPS.

Flashing type indicators are available for fitment to all Land-Rover models.

The side lamps of these vehicles have double filament bulbs, the heavy filament being connected to the flasher unit.

A small control unit comprising panel, switch, warning light and flasher is attached to the instrument panel. When the control switch is moved in direction of intended turn, the stop lamp circuit for the side concerned is cut out and the stop lamp bulb will commence to flash in conjunction with the flasher filament in the side lamp until the switch is cancelled, then the stop lamp bulb will function in the normal manner.

The warning light will flash when the indicators are functioning correctly and the flasher unit will be audible.

Should either a front or rear indicator bulb fail, the other bulb will continue to flash but the warning light will not be seen and the flasher will not be heard.

TRAFFICATORS.

Provision is made on 1955 Land-Rover models only for the fitment of trafficators. The operating switch is fitted to a bracket clamped on the steering column and should be moved through about 45° in the direction of the proposed turn, it must be returned by hand to the central OFF position when the turn has been completed.

The trafficator arm hinges should be oiled sparingly if the arms stick or become sluggish.

EXTRA WINDSCREEN WIPER.

An additional windscreen wiper and motor for front seat passengers can be supplied if desired. Its operation is identical with that on the driver's side (see Page E-9).

EXTRA HEAVY DUTY ROAD SPRINGS AND SHOCK ABSORBERS (86 and 88).

These springs and shock absorbers are for Land-Rover 86 and 88 models only, and are designed for vehicles operating permanently loaded or driven frequently over rough roads.

SPARE WHEEL CARRIER

When it is desired to utilise the entire body space, an alternative carrier for the spare wheel can be mounted on the bonnet panel. Versions suitable for either 6 in. or 7 in. tyres are available and comprise a central mounting plate, with four rubber support blocks positioned under the tyre wall to ensure even weight distribution.

HEATER/DEMISTER UNIT.

A re-circulatory heater unit is available with or without windscreen demisting attachments; it is heated from the engine cooling system and controlled by a rheostat switch.

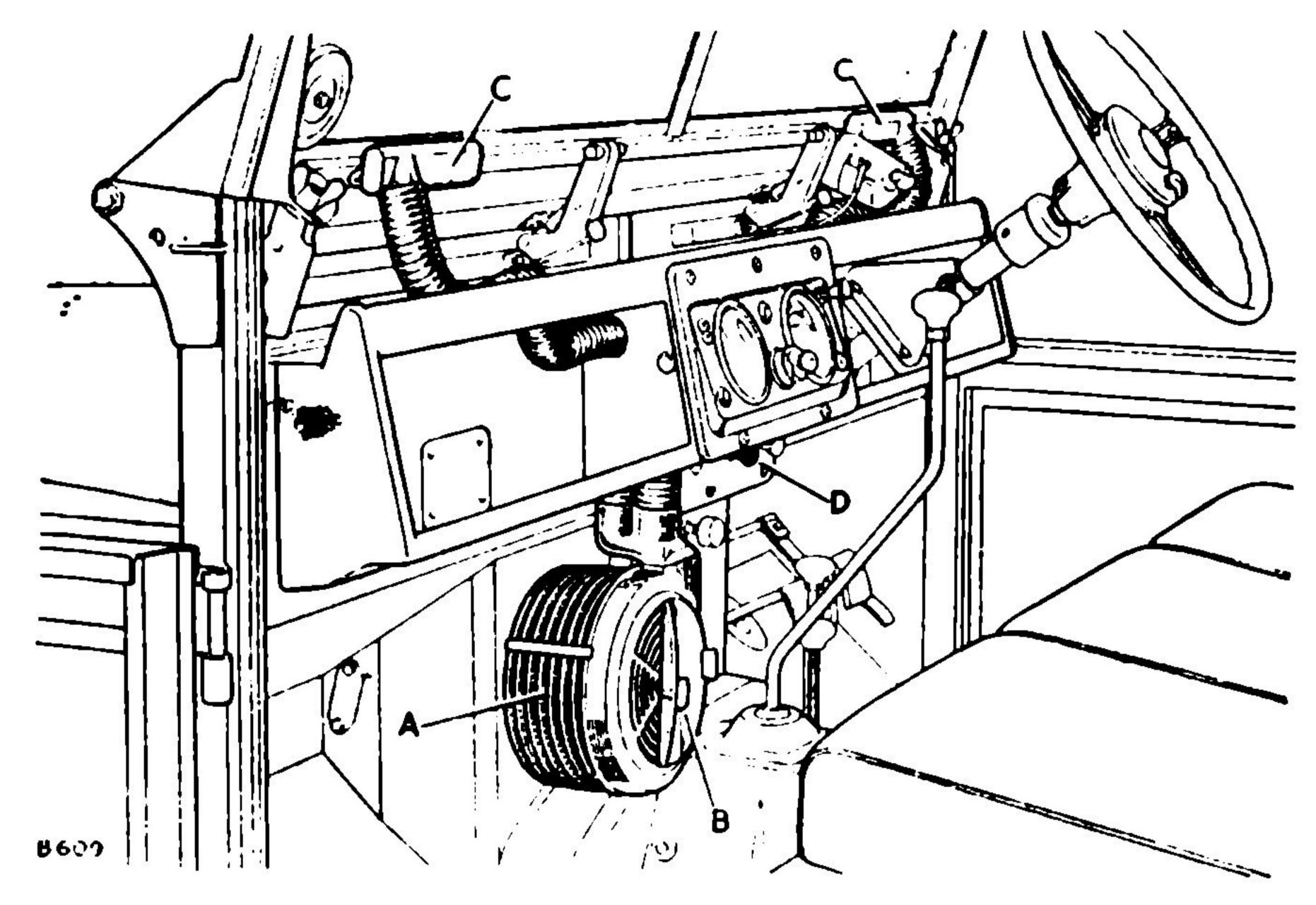


Fig. 56. Heater unit.

A—Heater. B—Shutter.

C—Demister nozzle. D—Rheostat switch.

To obtain warm air to the body of the vehicle and to the de-misters, open the flaps on the heater casing. The volume of air can be regulated by means of the rheostat switch, while the flaps afford control over the air flow.

If maximum air flow is required to the de-misters, set the switch to maximum speed and close the flaps.

In warm weather, the heater can be used for air circulation with the water supply cut off by means of the tap on the inlet pipe under the bonnet.

FLYSCREENS FOR DASH VENTS.

These consist of three gauze screens placed on the driver's side of the dash over the vent opening. They are suitable for all Land-Rover models.

LOCKING HANDLES AND PRIVATE LOCKS.

Locking handles are available for fitting to front R.H., and rear doors. A locking catch can be fitted to the lock on the inside of the L.H. front door and all sliding windows can be secured with locking attachments.

RADIO.

A radio can be fitted in the glove box on the driver's side; the aerial is mounted at the appropriate fixing on the windscreen frame.

Operating instructions are supplied with the set.

OIL PRESSURE AND WATER TEMPERATURE GAUGE.

A combined oil pressure and water temperature gauge can be fitted on the dash panel; the standard oil pressure warning light is left in position but disconnected.

CHAFF GUARD.

A fine-mesh chaff guard can be supplied to prevent the radiator becoming clogged when the vehicle is used for farm work.

The guard is clamped behind the radiator grille, using the existing fixings.

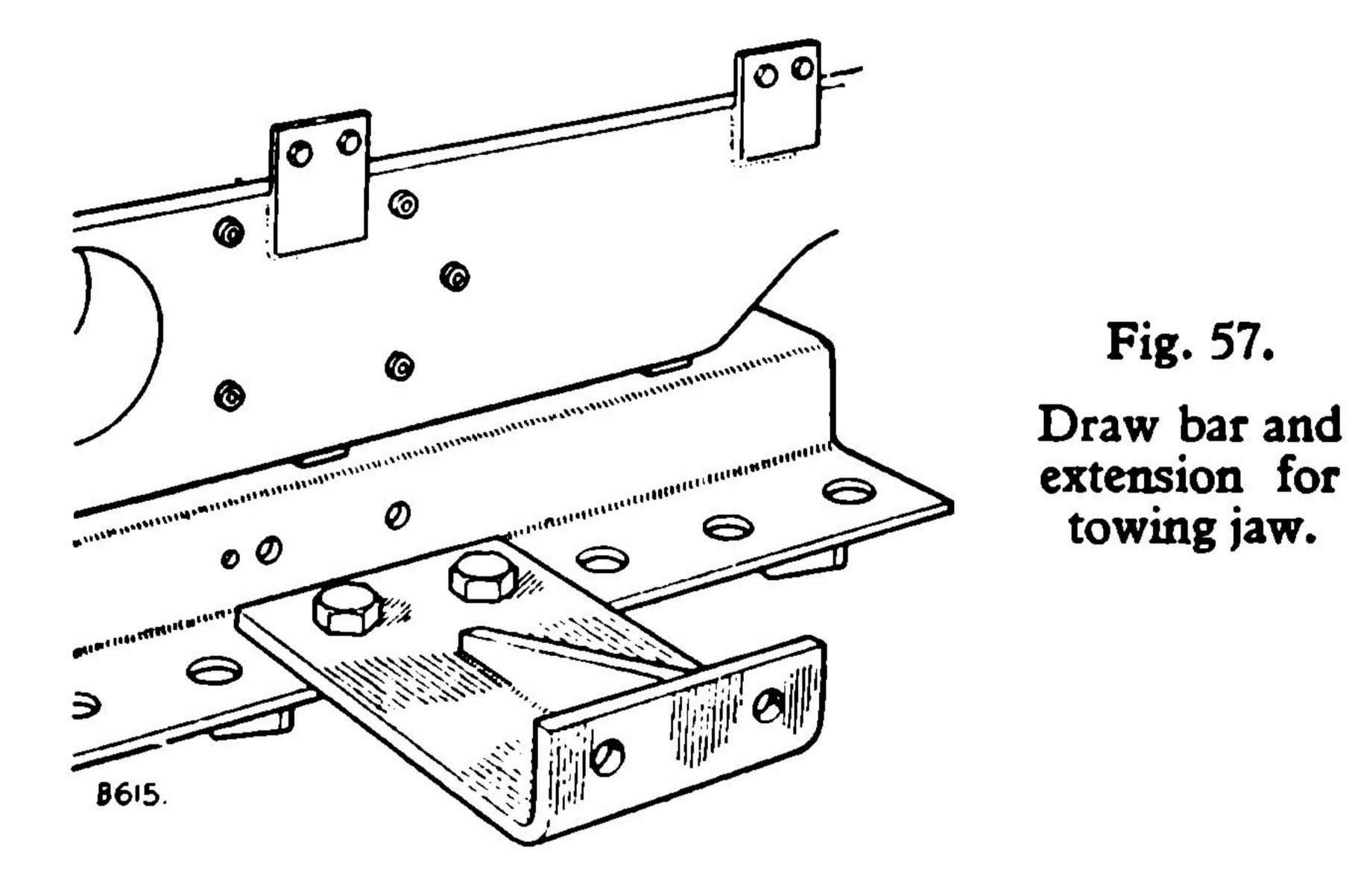
PROPELLER SHAFT COVERS.

Special covers are available to prevent the propeller shaft universal joints from becoming entangled with grass, etc., when the vehicle is used for haymaking or similar cross-country work.

The set of covers comprises shields under the front and rear differential joints and a plate secured under the transfer box to protect the front output shaft joint.

REAR DRAW BAR AND EXTENSION BRACKET FOR TOWING JAW.

Draw bar and bracket are supplied with the rear power take-off unit and are also available separately. They enable the towing jaw to be used with the power take-off unit in position.



ALTERNATIVE TOWING JAW.

This jaw is designed to suit trailers having a towing eye larger than can be used with the standard towing jaw; it is secured to the rear chassis cross member with four bolts.

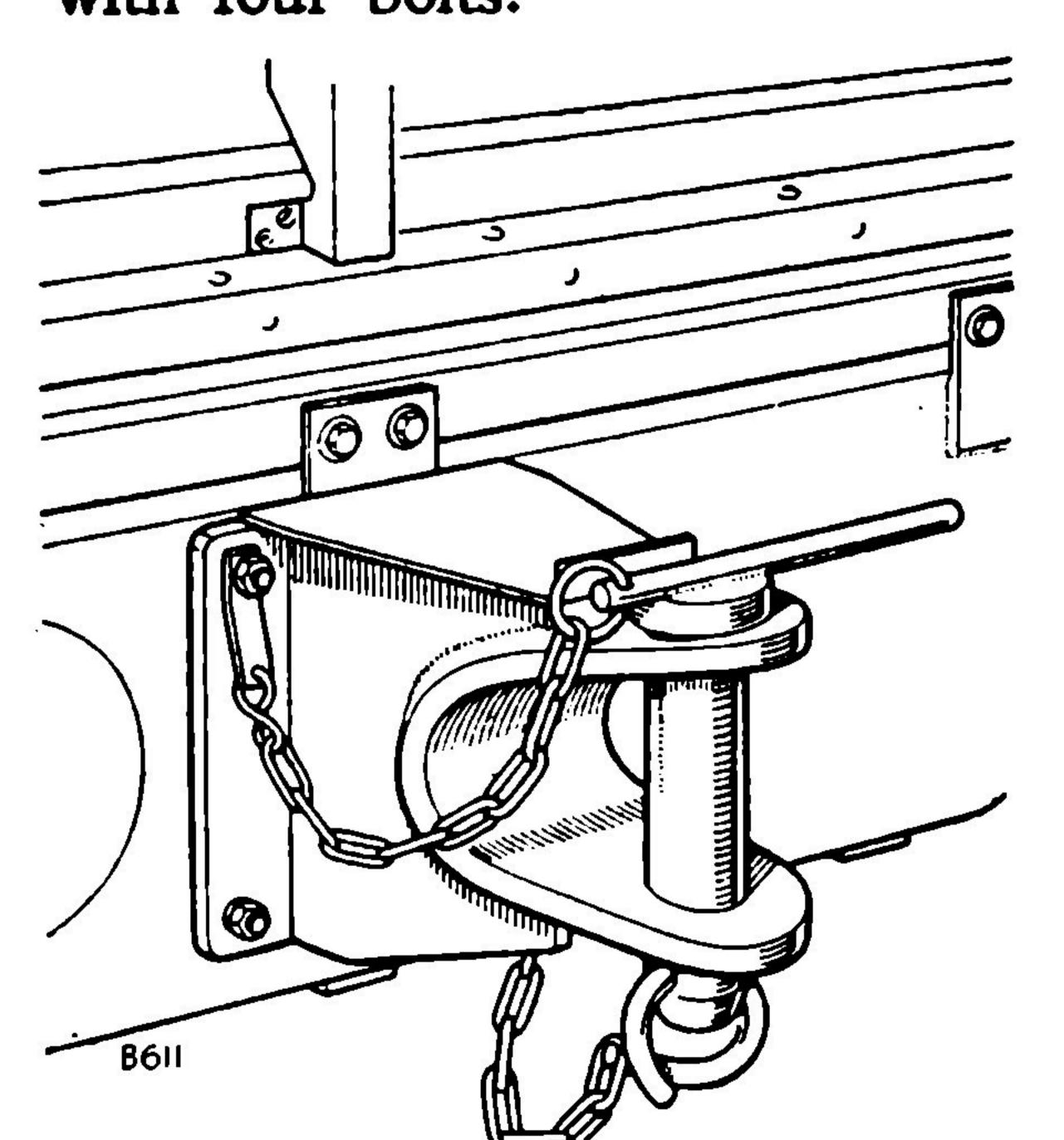


Fig. 58.

Large towing jaw.

LIFTING AND TOWING RINGS.

These are fitted one on each side of the front bumper, at the point where the bumper is attached to the chassis frame.

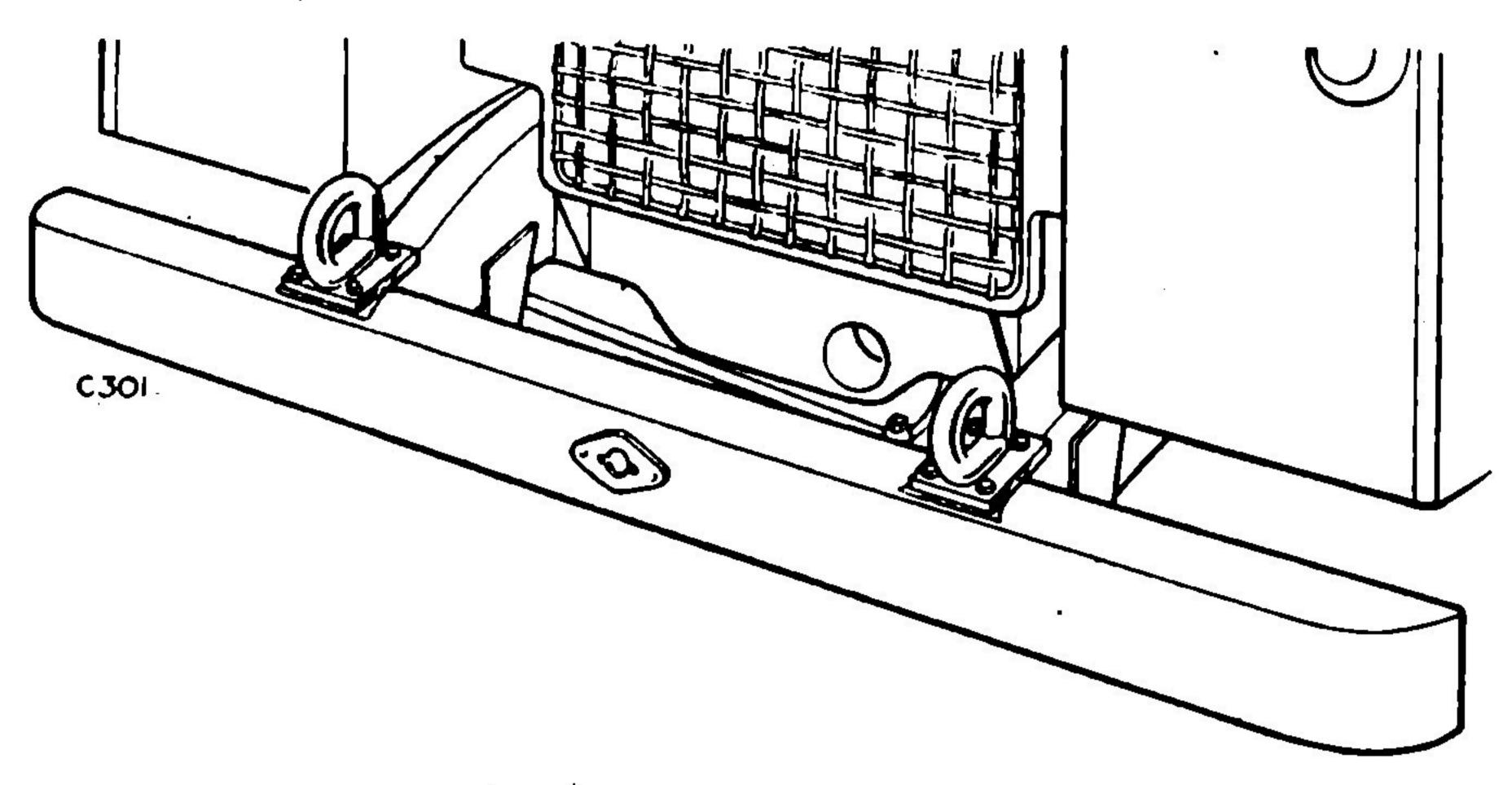


Fig. 59. Lifting and towing rings

TRAILER LAMP LEAD.

A plug and lead, 13 ft. (4 m.) long, is available to provide connection to stop and tail lights on a trailer. The three pins in the plug are numbered and the connections are as follows:—

- 1. Top. Black cable. Earth to stop, tail lamp.
- 2. Bottom L.H. Green cable. Feed to stop lamp.
- 3. Bottom R.H. Red cable. Feed to tail lamp.

ROAD SPEED GOVERNOR.

A special version of the engine governor (see Page E-48), without the quadrant control, can be used to limit the road speed of the vehicle to approximately 35 m.p.h. (55 k.p.h.) in top gear, with correspondingly lower speeds in intermediate gears.

POWER TAKE-OFF UNITS.

The lay-out of the Land-Rover transmission has been arranged so that power take-off drive for auxiliary equipment can be taken from two points. A pulley drive fitted immediately behind the gearbox (called the centre power take-off) can be used for driving appliances mounted on the vehicle, while the take-off unit at the rear, with spline and pulley drive, is for the purpose of driving all kinds of machinery, both stationary and towed. Either or both of these drives may be readily installed at any time and their presence in no way affects normal operation of the vehicle.

An engine governor (Page E-48) must be fitted when either the centre power take-off or rear pulley drive is in use. Under arduous operating conditions and/or in tropical climates, it may also be necessary to fit an engine oil cooler (Page E-48).

NOTE. For stationary work, engine R.P.M. must not be allowed to exceed 2,550, i.e., governor position 8. Should the machinery require a higher speed, a step-up belt drive or gearbox must be used.

The drive is taken through a dog-clutch on the rear of the gearbox mainshaft and incorporates a flanged output shaft. Selector mechanism is bolted to the top of the transfer box, the selector lever being accessible through a hinged cover plate in the seat-box centre panel. To engage the power take-off drive, the selector knob must be pushed forward.

Horse-power figures quoted throughout this section are in British units.

INSTALLATION OF DRIVE UNIT.

- 1. Remove the existing centre panel from the seat base and modify as detailed in the Fitting Instruction supplied with the kit of parts.
- 2. Remove the four nut sand spring washers securing the top cover plate on the transfer box and lift off the cover complete with joint washer.
- 3. Remove the mainshaft rear bearing housing assembly and joint washer from the rear of the transfer box, by removing the six nuts and spring washers.
- 4. Fit the power take-off drive unit assembly and joint washer to the rear of the transfer box and secure with the six nuts and spring washers.
- 5. Fit the power take-off selector assembly and joint washer to the top face of the transfer box, and secure with the four nuts and spring washers; ensure that the selector fork engages with the dog clutch on the drive shaft.
- 6. Fit hinged access cover to modified centre panel.

CENTRE POWER TAKE-OFF (86 and 88).

The driving pulley, usually of the multi-belt pattern, bolts directly on to the flanged output shaft. Operation and maintenance instructions for the driven equipment will be provided with the equipment and is available from the manufacturer. Not more than 20-25 B.H.P. can be transmitted through the centre power take-off, or damage to the rear engine mountings will result.

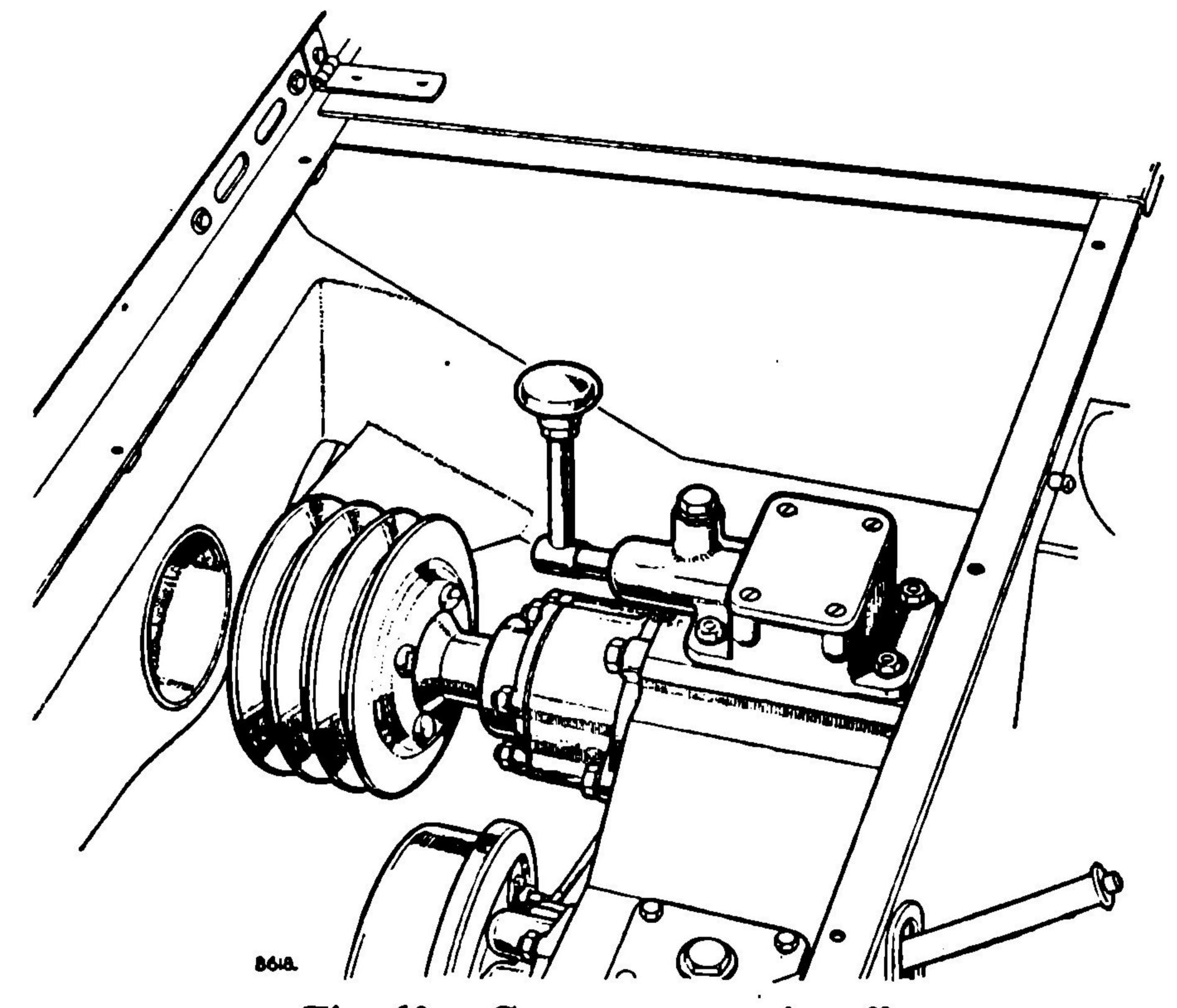


Fig. 60. Centre power take-off.

CENTRE POWER TAKE-OFF MAINTENANCE.

The belt drive to the driven equipment must be adjusted periodically, to ensure that the tension is correct. It should be possible to depress the belts by thumb pressure ½ to 1 in. (12 to 25 mm.) at a point midway between the pulleys.

In the case of multi-belt drives, all must be renewed if one belt breaks or is damaged. Whenever the belts are removed they should be marked to ensure replacement in the original grooves.

OPERATING NOTES.

1. The pulley drive is taken from the main gearbox output; pulley speed is therefore dependent on governor setting and main gearbox ratio as detailed in the chart:—

CENTRE POWER TAKE-OFF PULLEY R.P.M.:

Gover-	Engine	e Centre Power Take-off Pulley					
position	R.P.M.	First	Second	Third	Тор	Reverse	
1	1500	500	735	1090	1500	590	
2	1650	550	810	1200	1650	650	
3	1800	600	880	1305	1800	710	
4	1950	650	955	1415	1950	765	
5	2100	700	1030	1525	2100	825	
6	2250	750	1100	1635	2250	885 ·	
7	2400	800	1175	1740	2400	940	
8	2550	850	1250	1850	2550	1000	
9	2700	900	1320	1960 -	2700	1060	
10	2850	950	1395	2065	2850	1120	
11	3000	1000	1470	2180	3000	1180	

- 2. When selecting governor and gear change lever positions to arrive at the correct speed for driving any particular item of equipment (with the vehicle stationary), the aim should always be to choose as high a gear ratio as possible, provided that the throttle is not fully open when working under load. The use of a high gear will keep the engine speed down to a minimum and so result in economical fuel consumption.
- 3. In cases where the equipment is to be driven with the vehicle on the move, the gear and governor positions selected will be dictated to a large extent by the vehicle speed required, but an endeavour should be made to keep the main gearbox ratio as high as possible. The vehicle speeds in all combinations of gears and governor positions are given in the chart on Page E-46.
- 4. When it is desired to use the power take-off with the vehicle stationary, the transfer change lever must be set in the neutral (central) position.
- 5. To engage the drive, set the engine at idling speed, depress the clutch pedal, engage the required gear in the main gearbox and with the clutch pedal still depressed, engage the take-off drive by pushing the selector lever forward, easing the clutch as necessary to obtain engagement; release the clutch pedal and move the governor quadrant control to the required position.
- 6. To disengage the drive, move the governor control to the lowest position, depress the clutch pedal, disengage the take-off drive and return the mair gear change lever to neutral. Before re-engaging the drive, always allow the driven equipment to "coast" to a standstill, to prevent undue strain on the drive mechanism.

REAR POWER TAKE-OFF.

The rear power take-off unit, mounted on the rear chassis cross-member, is driven by a propeller shaft from the flanged output shaft at the rear of the gearbox and is designed to transmit up to 20-25 B.H.P.; the standard S.A.E. six-splined output shaft is on the centre-line of the vehicle and provides power for towed equipment.

INSTALLATION OF REAR POWER TAKE-OFF.

Assuming the drive unit to be already fitted:—

1. Late models. Fit rear draw bar.

Land-Rover 86 and 88 only.

2. Secure the propeller shaft to the input flange of the take-off unit, with the sliding joint at the front.

Pass the propeller shaft through the holes in the chassis cross members and secure the unit to the rear of the chassis with the bolts provided.

Secure the propeller shaft to the gearbox drive flange.

Land-Rover 107 and 109 only.

3. Secure the cross-member intermediate bearing support to the brackets welded to the chassis side members, using the bolts, spring washers and nuts provided.

Pass the universal joint end of the front propeller shaft forward through the hole provided in the centre chassis cross-member, and secure the front end of the shaft to the flanged drive shaft on the gearbox.

Secure the centre bearing housing to the crossmember intermediate bearing support by means of the rubber bushes, bolts, nuts, plain and spring washers provided.

When tightened, the rubber bushes on the centre bearing housing are compressed to a length of $1\frac{1}{2}$ in. (38 mm.); the bearing housing flange must be adjusted by means of shims which are supplied .048 in. thick, so that it lies centrally in the rubber bushes.

Secure the rear end of the rear propeller shaft to the input flange of the rear take-off unit, with the sliding joint at the front.

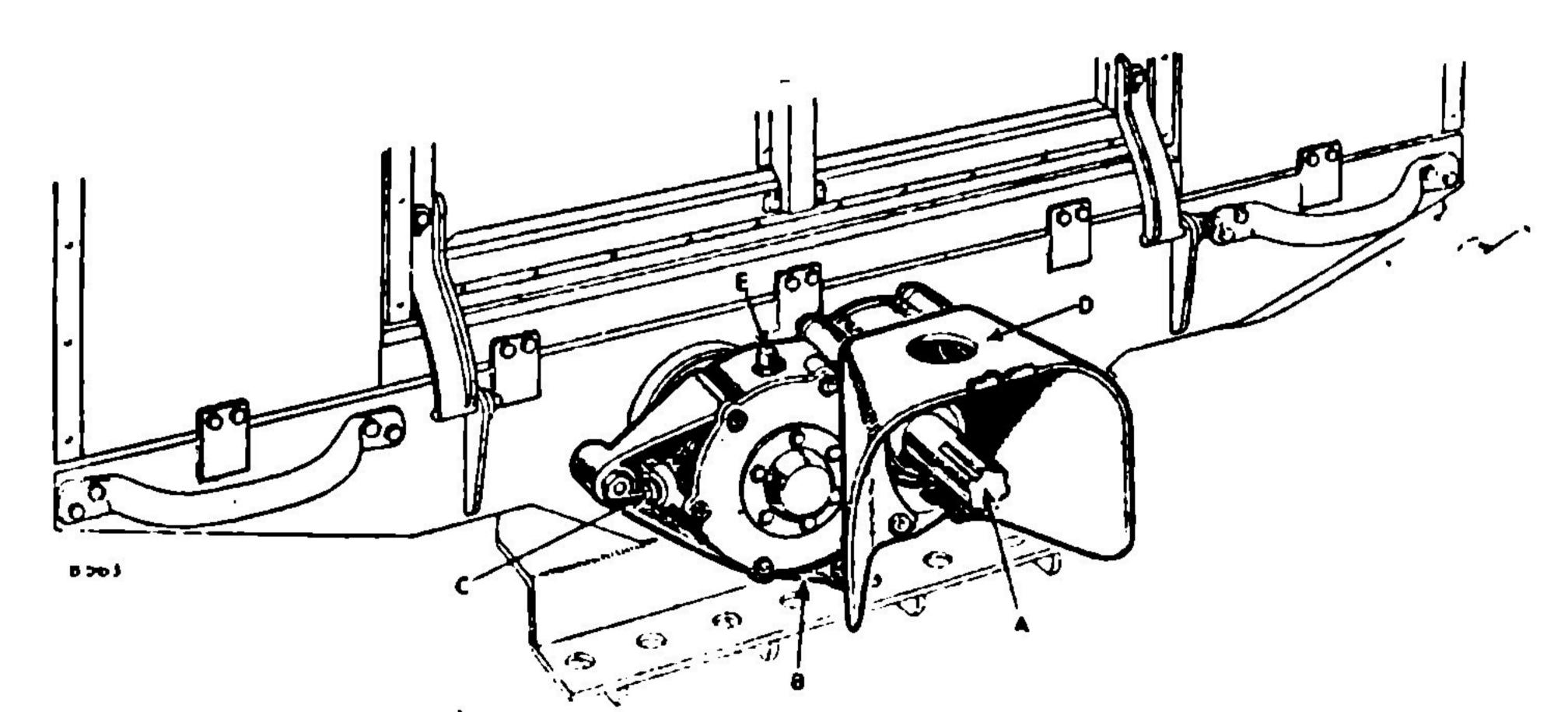


Fig. 61. Rear power take-off.

A—6-spline output shaft. C—Oil level/filler plug.

D-Shield.

B-Drain plug. E-Breather.

REAR POWER TAKE-OFF OUTPUT SHAFT R.P.M. AND VEHICLE SPEED (6.00-16 TYRES):

Course								Mai	n Gear	Change	Lever	in		•			
Gover- nor Eng Posi- R.P	Engine		First			Second		Third		Top			Reverse				
tion	R.P.IVI.	tn ,	Take-off R.P.M.	Vehicle M.P.H.	Speed K.P.H.	Take-off R.P.M.	Vehicle M.P.H.	Speed K.P.H.	Take-off R.P.M.	Vehicle M.P.H.	Speed K.P.H.	Take-off R.P.M.	Vehicle M.P.H.	Speed K.P.H.	Take-off R.P.M.	Vehicle M.P.H.	Speed K.P.H.
1	1500	Low	415	3.0	4,8	610	4.4	7,1	010	6.5	10,4	1250	8.9	14,5	490	3.6	5,8
No. 100 (100 (100 (100 (100 (100 (100 (100		High		7.5	12,0	610	11.0	17,5	910	16.0	25,5		22.5	36,0		9.0	14,5
2	1650	Low	460	3.3	5,3	670	4.8	7,7	1000	7.2	11,5	1276	9.8	16,0	540	4.0	6,4
222		High	400	8.3	13,5	670	12.0	19,5	1000	18.0	29,0	1375	25.0	40,0		10.0	160
3	1800	Low	500	3.6 5,	5,8	735	5.3	8,5	1090	7.8	12,5	1500	10.5	17,0	590	4:3	
22		High	500	9.0	14,5	755	13.0	21,0	1090	19.5	31,0	1500	27.0	43,5		10.8	17,5
4	1950	Low	540	3.9	6,3	795	5.7	9,2	1180	8.4	13,5	1625	11.5	18,5	635	4.7	7,6
		High	740	9.8	16,0		14.5	23,5	1100	21.0	33,5	1025	29.0	46,5		11.5	19,0
5	2100	Low	4.2 585 10.5	6,8	855	6.1	9,8	1270	9.1	14,5	1750	12.5	20,0	685	5.0	8,1	
		High		10.5	17,0		,15.5	25,0		23.0	37,0		31.5	50,5		12.5	20,5
6	2250	Low	625	4.5	7,2	920	6.6	10,5	1360	9.7	15,5	1875	13.5	22,0	735	5.4	8,6
		High		11.5	18,5		16.5	26,5		25.0	40,0		34.0	54,5		14.0	22,0
7	2400	Low	670	4.8	7,7	980	7.0	11,5	1450	10.4	16,5	2000	14.5	23,5	785	5.7	9,2
		High		12.0	19,5		.17.5	28,0		26.0	41,5		36.0	58,0		14.5	23,5
8	2550	Low	710	5.1	8.2	1040	7.4	12,0	1540	11.0	17,5	2125	15.0	24,5	835	6.1	9,8
		High	130	13.0	21,0		19.0	30,5		27.5	44,0		38.0	61,0		15.5	• 25,0
9	2700	Low	750	5.4	8,7	1100	7.9	13,0	1630	12.0	19,0	2250	16.0	26,0	885	6.5	10,4
		Hìgh	N 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	22,0		20.0	32,0		29.0	45,5		40.5	65,0		16.0	26,5	
10	2850	Low	790 5.7	9,2	1160	8.3	13,5	1720	12.5	21.0	2375	17.0	27,5	935	6.8	11,0	
		High			22,5		21.0	.0 34,0	1,20	31.0	49,5		42.5	68,5		17.0	27,0
11	3000	Low	835	6.0	9,7	1225	8.8	14,0	1820	13.0	22,0	2500	18.0	29,0	985	7.2	11,5
•		High		15.0	24,0		22.0	35,5	1020	32.5	52,0		45.0	72,5		18.0	29,0

Pass the sliding joint end of the propeller shaft forward through the holes provided in the rear and No. 5 (front bumper is No. 1 cross-member) cross-members and secure the power take-off unit to the rear cross-member with the fixings provided.

Secure the front end of the rear propeller shaft to the front shaft flange.

REAR POWER TAKE-OFF MAINTENANCE.

- 1. OIL LEVEL. The oil level must be checked at every 40 operation hours and replenished as necessary to the bottom of the filler/level plug hole on the side of the casing.
- 2. OIL CHANGES. The oil should be completely drained from the unit after the first 30 hours and thereafter at intervals of 6 months by removing the drain plug from the bottom of the casing; refill to the bottom of the level plug hole with oil of the recommended grade. The oil capacity is approximately 1 Imperial pint (0,5 litre).
- 3. PROPELLER SHAFT. Lubricate the three nipples on the propeller shaft with oil of the correct grade at intervals of 6 months.

OPERATING NOTES.

1. The take-off output shaft speed is dependent on engine speed or governor setting and main gearbox ratio, while the vehicle speed is controlled

also by the transfer box. as detailed in the chart, which should be consulted to obtain the correct relationship for any particular job. (Page E-44.)

- 2. Selection of the most satisfactory positions for the governor quadrant control and gear change levers will depend on various factors:—
 - (i) Type of ground to be negotiated.
 - (ii) Power required to pull any particular item of equipment.
 - (iii) Crop conditions.
 - (iv) Recommended speed for the equipment to be used.
- 3. When the rear power take-off is to be used with the vehicle stationary, the transfer lever must be placed in the neutral position; for all other work, the correct transfer ratio must be used, as shown in the chart.
- 4. The procedure for engaging and disengaging the drive is identical with that for the centre power take-off.
- 5. Certain farm machines will be damaged if driven in reverse and care must be taken in such cases to disengage the take-off drive when it is desired to reverse the vehicle.
- 6. A guard is provided for the splined output shaft and this should always be fitted to ensure the safety of the operator.

7. The gears in the take-off unit are normally arranged to give a 5/6 reduction in speed between the gearbox output and take-off output shafts; the chart applies to this condition.

Occasion may arise when this standard relationship between vehicle speed and power take-off R.P.M. is unsuitable for some particular item of equipment which the Land-Rover is called upon to operate. For this reason, provision has been made to transpose the take-off unit gears, so giving a step-up in tal off output speed of 6/5 against gearbox output speed.

With the s interchanged, the take-off output shaft R.P.M. at any given engine speed are increased by 36/25 over the R.P.M. shown in the table.

For example:—

At governor position 1, i.e., engine speed 1,500 R.P.M., with top gear engaged in the main gearbox, the chart shows that take-off speed is 1,250 R.P.M. with the standard 5/6 reduction. Under the same conditions, but with the gears transposed, take-off speed would be increased to 1,800 R.P.M.

Conversely, an equivalent decrease in vehicle speed at any given take-off speed can be achieved by transposing the gears.

For example:—

Again with top gear engaged in the main gearbox and low transfer ratio employed, the governor setting to give a take-off speed of approximately 1,800 R.P.M. (i.e., governor position 5) results in a vehicle speed of 12.5 m.p.h. (20 k.p.h.) with the standard 5/6 reduction. Under the same conditions, but with the take-off gears transposed, the same take-off speed of 1,800 R.P.M. would be achieved at governor position 1, wh en the vehicle speed would be reduced to 8.9 m.p.h. (14,5 k.p.h.).

To transpose the gears, proceed as follows:—

Drain off the oil from the take-off unit.

Remove the take-off unit from the chassis frame.

Remove the input shaft cover plate.

Remove the split pin, castle nut and plain washer from the end of the input shaft.

Remove the input shaft bearing housing complete with bearing.

Remove and preserve the shims from the input shaft and withdraw the 20-teeth gear.

Withdraw the 24-teeth gear from the output shaft in a similar manner.

Transpose the gears and re-assemble the unit by reversing the sequence of stripping operations. It is most important that the two sets of shims removed be replaced on their original shafts.

Refill the unit with oil.

REAR DRIVE PULLEY.

The 8 in. (200 mm.) rear drive pulley unit may be attached to the rear power take-off unit in place of the guard by means of four spring washers and nuts. Difficulty would be experienced in holding the vehicle steady if more than 20 B.H.P. is transmitted through the pulley.

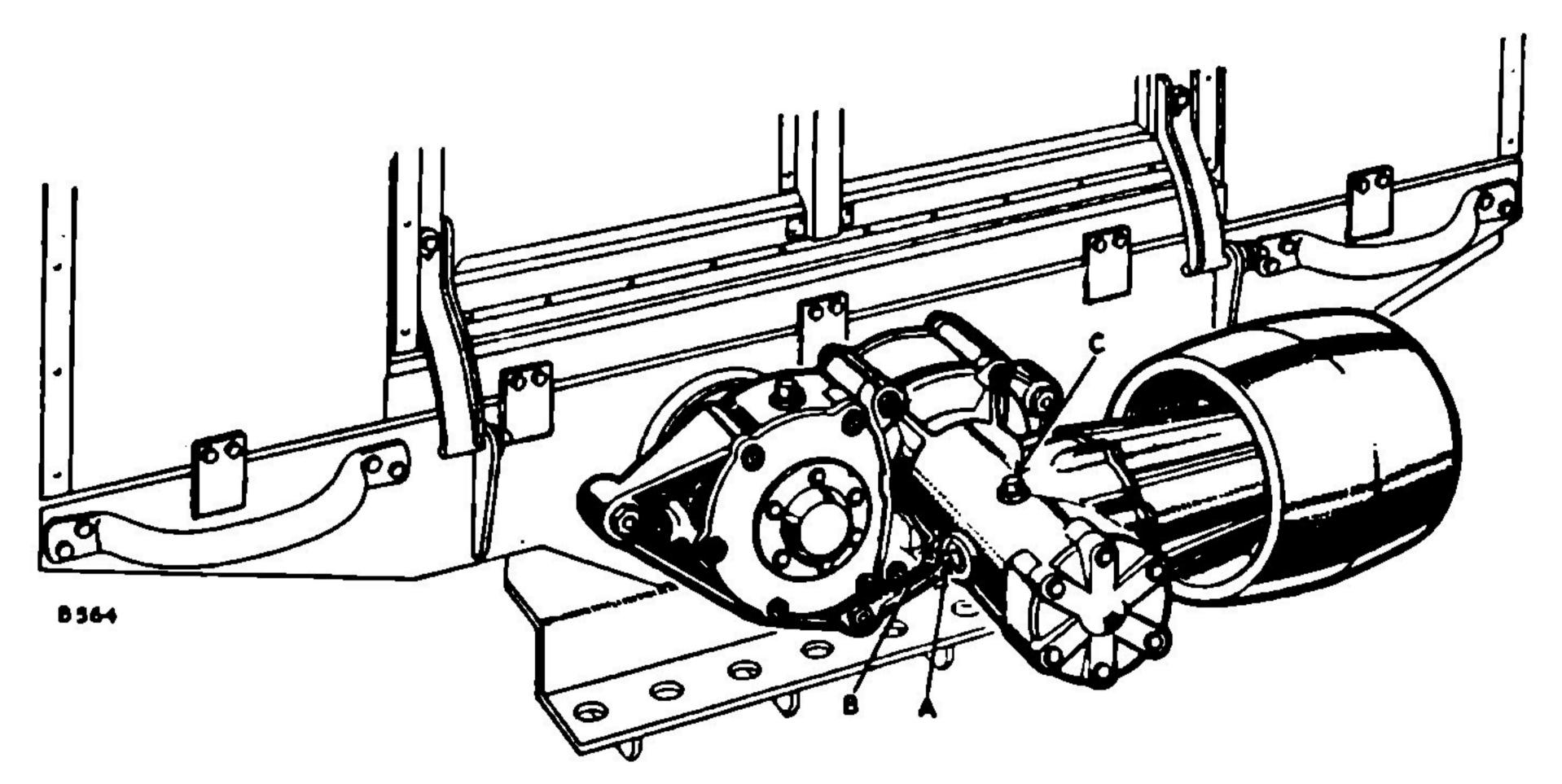


Fig. 62. Rear drive pulley.

A-Oil filler plug. B-Oil level plug. C-Breather.

REAR DRIVE PULLEY MAINTENANCE.

- 1. OIL LEVEL. The oil level must be checked at every 40 operation hours and replenished as necessary to the bottom of the small level plug hole in the side of the casing, through the larger filler plug hole.
- 2. OIL CHANGES. The oil should be completely drained from the unit after the first 30 hours and thereafter at intervals of 6 months by removing the unit from the vehicle and pouring out the oil through the filler plug hole. Refill to the bottom of the level plug hole with oil of the recommended grade; the capacity is approximately { Imperial pint (0,5 litre).

OPERATING NOTES.

1. The pulley speed is dependent on governor setting and main gearbox ratio as detailed in the chart.

REAR DRIVE PULLEY R.P.M.

Governor	Engine R.P.M.	Re	Rear Drive Pulley R.P.M.							
position		First	Second	Third	Тор	Reverse				
1	1500	360	525	780	1070	420				
2	1650	400	575	855	1180	465				
3	1800	430	630	935	1290	505				
4	1950	465	680	1010	1390	550				
5	2100	500	735	1090	1500	590				
6	2250	535	785	1170	1610	630				
7	2400	570	840	1245	1715	675				
8	2550	610	890	1320	1820	715				
9	2700	645	945	1400	1930	760				
10	2850	680	1000	1475	2040	800				
11	3000	715	1050	1555	2145	840				

2. It is most important to ensure alignment of the belt in the centre of the pulley and also to obtain the correct tension on the belt; the belt tension

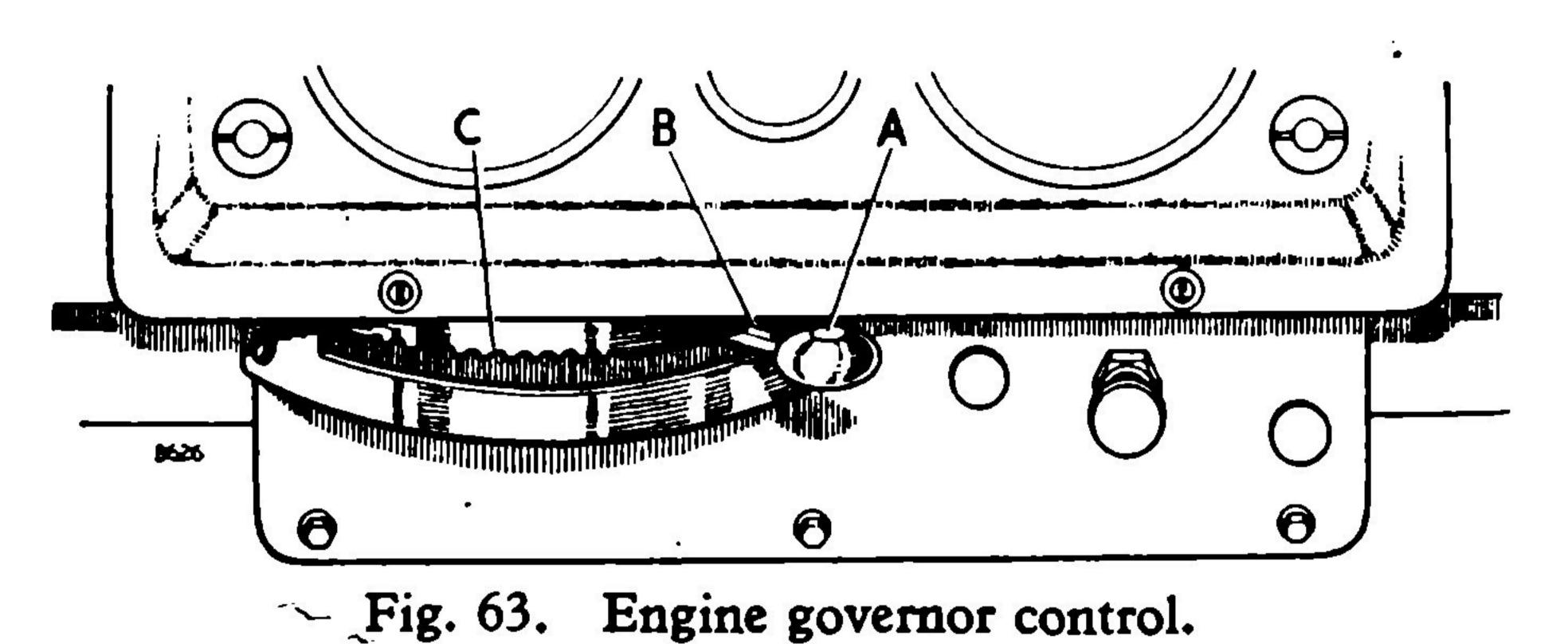
is correct when the hand-brake will hold the vehicle and the two sides of the belt cannot be compressed completely together by hand at a point midway between the vehicle and the driven machine.

- 3. The operating speed must be set as nearly as possible to that recommended by the equipment manufacturer. When selecting governor and gear change lever positions to arrive at the correct driving speed, the aim should always be to choose as high a gear ratio as possible, provided that the throttle is not fully open when working under load. The use of a high gear will keep the engine speed down to a minimum and so result in economical fuel consumption.
- 4. Engage the drive in the same way as detailed for the centre power take-off on Page E-46.

ENGINE GOVERNOR.

An engine governor must be fitted when a centre power take-off or rear drive pulley is used; it would also simplify many jobs necessitating use of the rear splined output shaft.

It is belt-driven from the fan pulley and connected to a quadrant lever on the dash panel.



A—Quadrant lever. B—Inoperative position. C—Operating notches.

The quadrant has notches giving twelve positions for the operating lever. The notch to the extreme right is for use when the governor is not required and with the lever in this position the throttle opening is not influenced by the governor mechanism. In order to bring the governor into operation, the control lever must be moved to the left into one of the remaining eleven notches; with the lever in the first operating notch, the throttle is opened until the engine is running at 1,500 R.P.M. and the governor will then allow for variations in load applied at the power take-off, so controlling the engine speed at that figure. Each succeeding notch represents an increase in engine speed of approximately 150 R.P.M. so that the eleventh and last notch on the extreme left of the quadrant will provide an engine speed of 3,000 R.P.M.

ENGINE GOVERNOR MAINTENANCE.

Every 40 operation hours, check the oil level in the governor body by removing the filler plug at the top front and the level plug at the right-hand side; replenish as necessary with engine oil through the filler hole, until the level is to the bottom of the level plug hole. Replace both plugs.

OIL COOLER.

An engine oil cooler must be fitted when the vehicle is used to drive stationary equipment under conditions in excess of:—

Power required: 24 B.H.P.

R.P.M.: 2,000.

Ambient air temperature: 20°C. (68°F.).

Running time: 30 minutes.

It incorporates a cooling radiator inserted in the engine oil system and mounted just in front of the radiator; a gauge on the dash panel gives continuous indication of the oil temperature.

The oil temperature should never exceed 90°C. and the engine must be switched off and the oil allowed to cool down if this temperature is reached under working conditions.

CAPSTAN WINCH

The front capstan winch, designed for a maximum pull of 2,500 lb. (1.135 kg.), is mounted on the front bumper and driven directly from the engine crank-shaft.

The winch must be used with the engine running at 600 R.P.M., i.e., a fast idling speed and for this purpose a hand throttle control must also be fitted.

It is used with one end of the rope attached to the vehicle being pulled, then wound twice round the bollard, and with the winch drive engaged, the operator maintains a steady pull on the free end of the rope thus causing it to grip the bollard.

The most suitable rope size and type is $1\frac{1}{4}$ in. (31,5 mm.) Manilla.

Rope speed is $12\frac{2}{3}$ ft./min. (4 metre/min.) at 600 engine R.P.M.

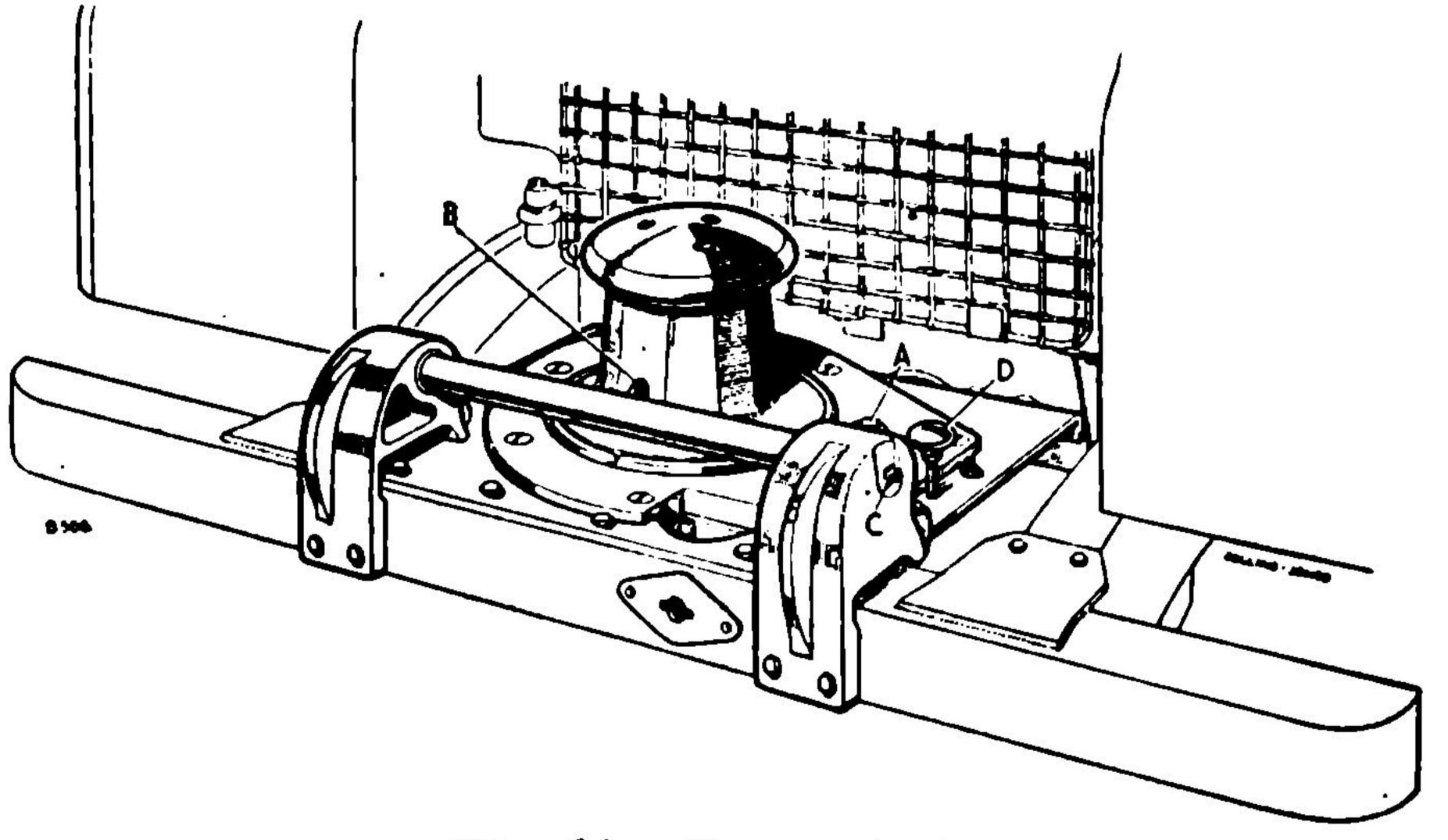


Fig. 64. Front winch.

A—Filler plug and dipstick.

B—Access hole for bollard shaft nipple.

C-Rope guide lubrication nipples.

D-Operating knob.

The drive should be engaged or disengaged by means of the operating knob on the winch casing, with the engine stationary and without any load on the rope.

With the winch installed, provision is made for the engine starting handle to be applied at the front of the winch instead of at the dog on the crankshaft.

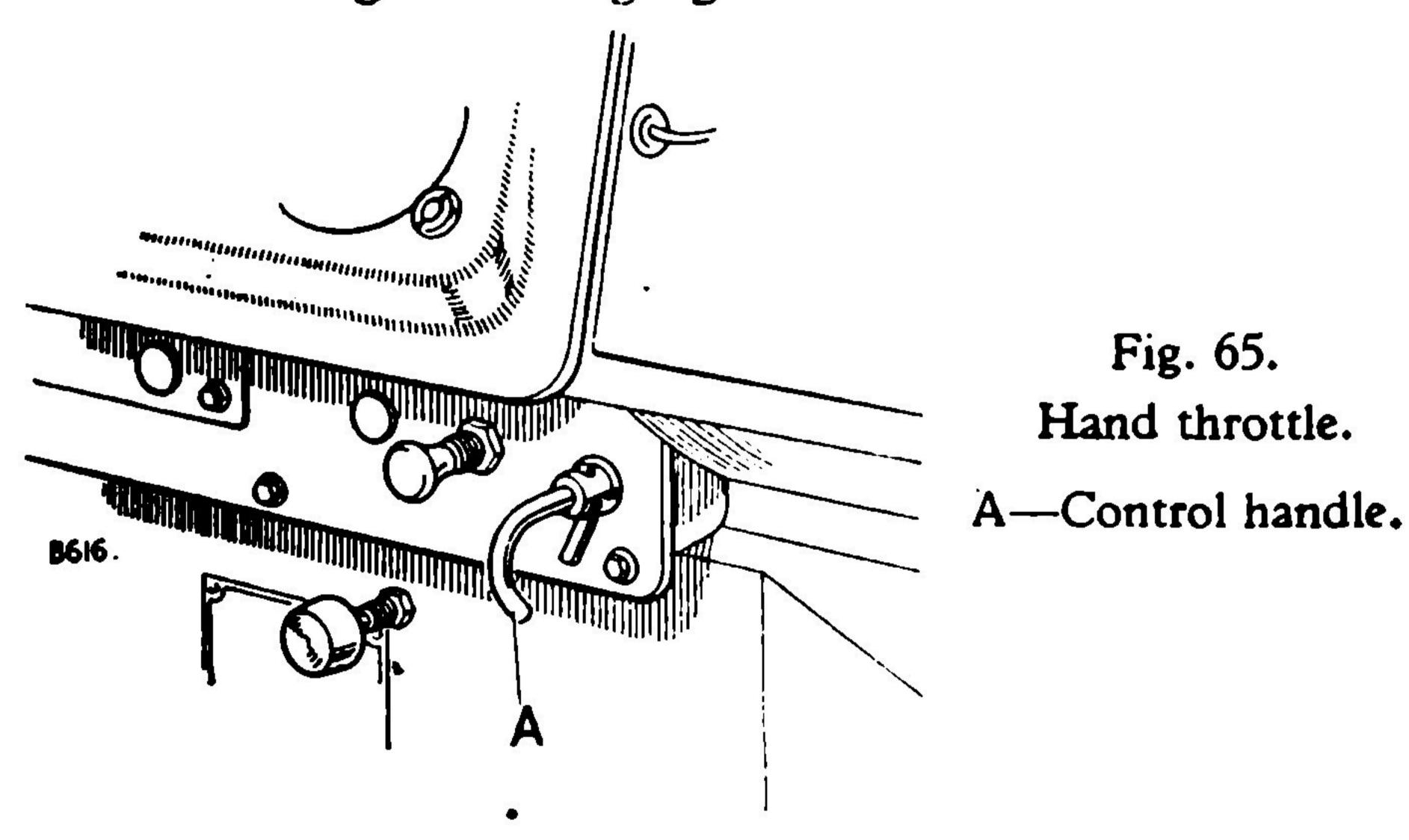
FRONT WINCH MAINTENANCE.

- 1. OIL LEVEL. Every 40 operation hours, check the oil level by means of the dipstick incorporated in the filler plug and replenish as necessary.
- 2. OIL CHANGES. Every six months, drain off the oil through the drain plug in the bottom of the winch casing and refill with oil of the correct grade; the capacity is 3½ Imperial pints (2 litres).
- 3. LUBRICATION NIPPLE. Access to the lubrication nipple on the bollard shaft is gained by turning the bollard until the hole is in line with nipple. Lubricate this point at intervals of 40 operation hours.

In addition, lubrication nipples are provided on the drive shaft and rope guide. Access to the drive shaft nipple may be gained from beneath the vehicle. Lubricate these points occasionally.

HAND THROTTLE CONTROL.

A hand throttle control can be mounted on the dash panel and must be used in conjunction with the capstan winches; it would also be useful when operating other equipment demanding a fast idling engine speed. To increase engine speed, pull out the control handle as far as necessary; always push the handle right in prior to using the vehicle on the road, to facilitate gear changing.



SPARE WHEEL COVER.

A blue leather cloth cover for the spare wheel, mounted on the bonnet, is available but is only suitable for 7.00" tyres.

LAND-ROVER TRAILER.

A two-wheeled trailer has been specially designed for use with the Land-Rover; its normal capacity is 1,680 lb. (760 kg.), but, over exceptionally rough ground, the load should be restricted to 1,340 lb. (650 kg.). Chief dimensions are as follows:

Body: length	72 in. (1,82 m.)
width	36 in. (914 mm.)
depth	18 in. (457 mm.)
capacity	27 cu. ft. (0,76 m ³
Overall width	61 in. (1,55 m.)
Track	50 in. (1,27 m.)
Overall length	108 in. (2,74 m.)
Weight (unladen)	620 lb. (280 kg.)

Weight (maximum approved gross

loaded) 2,300 lb. (1.040 kg')

The wheels and tyres fitted to this trailer are identical with those used for the Land-Rover 86; the track is also the same.

A special towing ball which bolts directly on to the rear chassis cross member is supplied with the trailer. The towing ball cup on the pull pin is adjustable to allow wear on the towing ball to be taken up, so enabling a snug fit of the ball to be maintained at all times.

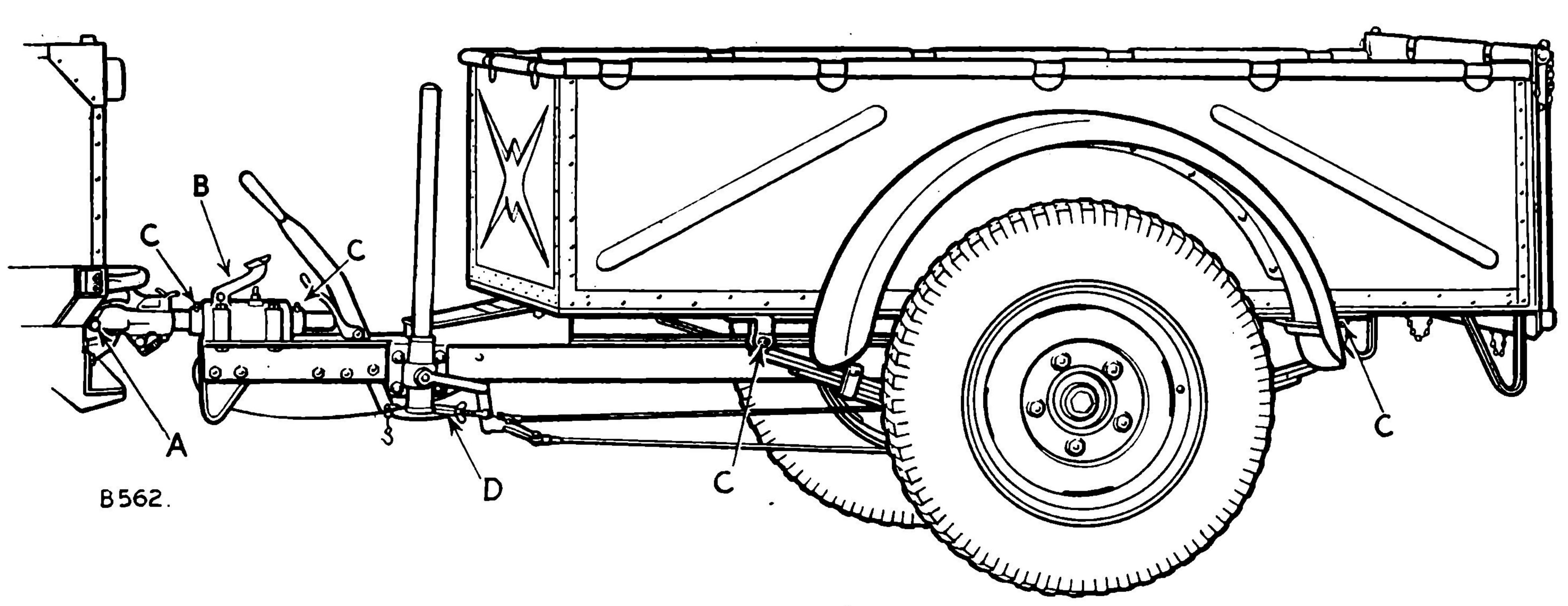


Fig. 66. Trailer.

A-Towing ball adjustment.

B-Reverse catch.

C-Grease nipples.

D-Brake adjustment.

The pull pin is interconnected with the brake linkage, so that when the vehicle brakes are applied and the trailer tends to over-run the towing vehicle, the trailer brakes are automatically applied. When reversing, a pivoted catch on the pull pin housing must be swung down to limit the pull pin travel, to keep the brakes in the "off" position.

TRAILER MAINTENANCE.

1. LUBRICATION NIPPLES. Every 1,000 miles (1.500 km.) apply one of the recommended oils at the nipples provided on the pull pin housing, brake cams and shackle pins (10 nipples in all). At the same time, smear the towing ball and cup with grease.

2. BRAKES. Periodically adjust the brakes, by means of the wing nuts provided in the linkage, so that they commence to function when the pull pin is pushed in 1 in. (25 mm.).

SPECIAL VEHICLES

Special vehicles can be supplied with auxiliary equipment, such as fire-fighting apparatus etc., permanently installed. Such vehicles are despatched complete with instructional literature applicable to the special fittings.

SECTION D

ROVER SERVICE ORGANISATION

Instructions are given in this book for items of routine maintenance to which due attention should be paid

if smooth and efficient running is to be ensured.

In addition, however, there may be times when additional information is desired, either on repair work

beyond the scope of this manual or when some difficulty is experienced.

We are always pleased to give such cases our special attention and to reply as fully as possible to any queries

you may raise by letter or when you visit either of our Service Depots at Solihull and London.

Complete instructions can be supplied for any operation which you may desire to carry out on your

Land-Rover; alternatively, a complete Workshop Manual is available, from any Rover distributor or dealer.

In the event of spare parts being required, they may be obtained through the nearest Rover distributor

or dealer, or, in cases where difficulty is experienced, directly from us.

Additional copies of this instruction manual may be obtained from any Rover distributor or dealer.

Please address enquiries under all these headings to:—

The Rover Co., Ltd.,

Service Department,

Solihull,

Warwickshire,

ENGLAND.

Telephone: SHEldon 2461 and 2613.

Telegrams: Rovrepair, Solihull.